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Interactive Placemaking: Creativity and User Experience at Urban Installations

Anijo Punnen Mathew



The Open University

Thesis submitted in partial fulfilment of the requirements for the degree of Doctor of Philosophy

Submitted on 31st March 2013

Abstract

Interactive placemaking offers many new opportunities for the consideration and design of urban place, particularly through offering engagement with the creativity and experiences of local populations. This thesis explores the recent area of interactive placemaking from analytical and creative perspectives in developing a framework for both describing behaviours and producing design guidelines.

The thesis begins by drawing together and building on existing work in HCI and Design to provide an initial framework for the analysis of interactive place. The framework combines theoretical and practical threads to look at two central questions: how do people behave in interactive places, and how do we design such interactive places? The assumption underlying the thesis is that users' behaviours in public spaces can be observed, abstracted, and formalised to the extent that designers can use in designing and evaluating interactive public installations.

In observational studies of four interactive installations the thesis progressively develops the original framework so that it is usable, accessible and understandable by designers. The thesis then goes on to evaluate how twenty design students used the framework to realise a number of public interactive installations in the city of Chicago. The thesis concludes by combining insights from existing research and insights from the studies conducted to present a comprehensive and robust framework structure. The main contribution of the thesis is thus a new generative and evaluative framework for interactive placemaking.

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Acknowledgments

This thesis dissertation was written across five different spaces in a span of five years. Across these spaces, several people, organisations, resources, and relationships helped make them places conducive to enlightened research. The initial idea of working on a PhD began in Starkville, Mississippi. I had just started my career as an Assistant Professor at Mississippi State University when Dr. Larry Barrow and Dr. Rachel McCann provided me the necessary nudge to think deeper about my position on placemaking and work on this thesis. Thanks to the College of Architecture, Art, and Design and the Design Research and Informatics Laboratory at Mississippi State University for providing me with the necessary environment for critical thinking and research.

All the projects and installations described in this thesis were located in the great city of Chicago, Illinois. During my tenure as an Assistant Professor at IIT Institute of Design, Dean Patrick Whitney and Associate Dean Hugh Musick provided me with valuable time, resources, funding, and most importantly advice to build out the research needed to complete this thesis. Thanks to Tyrone Tabing of the Chicago Loop Alliance, Carolina Jayaram of the Chicago Artists Coalition, Lou Raizin of Broadway in Chicago, along with Commissioner Michelle Boone, Deputy Commissioner Jewel Malone, and Director Julie Burros at the Department of Cultural Affairs and Special Events of City of Chicago and all who provided valuable resources to complete my work. I am also indebted to the students and faculty members of IIT Institute of Design for providing me with the necessary support without which I might never have finished.

Much of the writing of the thesis was completed while I was in Mumbai, India on the campuses of Godrej & Boyce Ltd. Mr. G. Sunderraman, Navroze Godrej, as well as the team at

the Innovation Centre must all be thanked for providing me with both the space and place to support my writing.

The space that connects all of the above is of course Milton Keynes, UK, where at the Open University my supervisors Prof. Yvonne Rogers, and Prof. Peter Lloyd tirelessly guided me through my research, answered all of my questions, completed all forms in time, and provided me with the critical feedback required to complete a work of this stature. I am not sure they knew what was in store when they agreed to become my supervisors in 2008, but I cannot thank them enough for guiding me, advising me, critiquing me, and helping me through the last five years. I must also thank the Faculty of Mathematics, Computing and Technology for providing me with the opportunity to work on this thesis. Thanks also to members of the Pervasive Interaction Lab at Open University – Dr. Sheep Dalton, Dr. Paul Marshall, Dr. Eva Hornecker, Dr. Jeff Rick, and Richie Hazelwood, all of whom at different points made me comfortable in Milton Keynes, took me out for meals, ganged up at CHI conferences, and most importantly provided the necessary feedback and push to finish this work.

In conclusion, I cannot forget the most important space of them all – my house, where my wife Shilpi, and my daughter, Aanya waited patiently as I embarked on this great adventure and supported me with the necessary cajoles, advice, reprimand, cuddles, and smiles. I must also thank my friend and mentor, Dr. Kevin Ward, and my father-in-law, Dr. Krishna Kumar both of whom provided me with critique and guidance when I required it most. And finally no thank you will suffice for my parents, my in-laws, and my whole family to whom I am greatly indebted for this thesis, and everything in my life.

The following agencies provided the funding necessary to complete this thesis: Mississippi State University, IIT Institute of Design, Chicago Loop Alliance, and the City of Chicago.

Dedicated to urban spaces around the world and all the things that make them great places.

Chapter 1. Introduction

By the middle of this century, it is estimated that the global urban population will more than double, increasing from 3.4 billion in 2009 to 6.4 billion in 2050. The numbers are equally staggering in developing countries, changing from 2.5 billion in 2009 to almost 5.2 billion in 2050¹. Designing for this new urban context becomes one of the most important agendas of our times. As technology permeates every aspect of our lives, cities too will have to adapt and accommodate new models of interaction and communication. Urban agencies such as the Chicago Loop Alliance, Times Square Alliance, as well as government agencies such as the Singapore Urban Redevelopment Authority, Chicago Mayor's office are challenged by this shift, often looking to designers for insight into the new urban experience. "Placemaking" is a term that architects and planners use to describe the creation of urban spaces that attract people because they are pleasurable or interesting. Project for Public Spaces (PPS 2012) further defines it as the *process* which fosters the creation of vital public destinations: the kind of places where people feel a strong stake in their communities and a commitment to making things better. Placemaking is an important topic of discussion within urban organisations. It is most often discussed in terms of spatial configurations and reconfigurations and changes to existing infrastructure to make place more attractive and interesting. It answers an important question in the context of new urbanisation - what is the modern agora?

Recently however urban planners and government agencies are seeing significant changes in people's sensibilities and expectations; the arrival of mobile, locative, and ubiquitous technologies have placed new demands on the design of urban place. In order to respond to the changing nature of the urban citizen, many urban organisations and companies are now

¹ As per the WHO Global Health Observatory, see http://www.who.int/gho/urban_health

asking designers to create placemaking experiences that are increasingly interactive and responsive. For example, in 2012 the City of Chicago approached IIT Institute of Design and myself to re-imagine civic engagement through “constantly on” participatory environments where users could share, view, and collectively build on each other’s ideas. Other policy organisations like the Chicago Loop Alliance, Singapore Urban Redevelopment Authority, and large business entities like Sears and Motorola have initiatives which use technology in urban places to engage the urban citizen. Interactive public installations are now commonplace as can be seen in the work of several HCI researchers (O’Hara, Glancy, and Robertshaw 2008; Snibbe and Raffle 2009; Reeves et al. 2005; Peltonen et al. 2008; Hornecker 2008) and often become part of urban infrastructure in many places (Lozano-Hemmer 2002). Google’s recent announcement of an open source API for the design of interactive spaces (Hughes 2012) is further evidence that technology is moving from research labs and experimental prototypes into real world implementations.

The appeal of “interactive” placemaking for urban planners comes from the fact that embedding surfaces and artefacts with computing opens up opportunities for the urban citizen to play an active role in the creation and sharing of information. This eventually leads to increased cooperation and collective action among the urban citizenry (Shirky 2009, 2010; Anderson 2006). Governments and urban organisations can thereby build place not just by designing urban infrastructure but also engaging users in *public creativity*.

Public creativity is a term that has been coined as part of my research to define the social construction of user generated and collaborative content at public installations. It is an extension of collective or social (group) creativity where the creativity comes from the aggregation of user generated content *in public spaces*. Public creativity transcends models of information production and consumption from the 20th century by engaging the creative

potential of urban citizens (Shirky 2010; Anderson 2006, 2009). This allows organisations to understand the population better and respond almost immediately to the needs of the citizen. In the long term, an engaged citizen is one that plays a larger role in the improvement of cities and urban life.

1.1 An opportunity for methods and frameworks

Given the basic premise that an engaged citizen is important for urban life, future placemaking installations cannot solely depend on experiences crafted solely by a designer. Rather they should be places where the public can be persuaded to engage and create their own experiences. These initiatives transfer the creative process, once reserved for the designer to the public, and now includes engaging the public. The role of the designer is no longer exclusively about designing a place, but designing platforms from which creative experiences can emerge. It thus becomes imperative that designers and design firms have the ability to understand, build on, and transfer knowledge about interactive public installations where the public are involved in the creation of their own experiences. Architecture and design firms like Gensler, Gravity Tank, IDEO, and Clarity Consulting that are often called upon to design and deploy such environments recognize that this change requires a completely a new way of thinking about urban space. Choose Chicago, the tourism department of the City of Chicago, Gensler, Chicago Loop Alliance, and Chicago Architecture Foundation, for example, have all invited me to be part of committees that evaluate new placemaking opportunities in Chicago.

New experiments in the design and evaluation of interactive public installations (O'Hara, Glancy, and Robertshaw 2008; Snibbe and Raffle 2009; Reeves et al. 2005; Peltonen et al. 2008; Hornecker 2008) are built on the premise that mergers of physical and digital infrastructure can be viewed from a phenomenological perspective. This emergent paradigm (Dourish 2004; Harrison, Tatar, and Sengers 2007; Harrison, Sengers, and Tatar 2011; Sengers

and Gaver 2006) treats interaction not as a form of information processing but as a form of meaning making in which the artefact and its context at all levels are mutually defining and subject to multiple interpretations by the embodied user in a particular context. The paradigm suggests that experience is not *a priori* in the infrastructural artefacts of the built environment, rather it emerges through people's actions and activities, practice and experience in locational space (Ciolfi and Bannon 2005). Frameworks built from insights around user behaviour can be useful and effective in the construction of such installations.

Evaluating placemaking from a phenomenological perspective opens up the potential for comprehensive lenses which could help in the generation and evaluation of rich interactions. It also lays ground for frameworks that designers can use for new and innovative urban interactions. Studies of installations designed by the researchers (Brignull and Rogers 2003; Reeves et al. 2005; Bilda, Edmonds, and Candy 2008; Hornecker 2008; Peltonen et al. 2008), as well as studies of engagement with existing installations (Bilda, Edmonds, and Candy 2008; Dalsgaard and Hansen 2008; Benford et al. 2009) have shown that informed insights from observing users and their behaviour in embodied contexts can provide directions for understanding interaction and building future installations.

This raises a key question - how can academic research help design practice, and design practitioners with the development of new and innovative placemaking experiences?

One approach is shown by Project for Public Spaces, who on their website outline an 11 step process which can assist communities in creating great urban place (2012). Most urban organisations often turn to such resources when they need to design placemaking experiences. A key challenge in "interactive" placemaking is the development of such a method or framework that can provide guidance and advice on designing for interactivity that engages citizens. We need to ask how "interactive" placemaking is different from placemaking.

How can public creativity be engaged through interactive place? What methods and tools can designers use in the design and evaluation of public creative installations?

This thesis proposes a new approach to answer these questions - a framework that will enable designers to generate and evaluate interactive placemaking, thus giving designers the methods and tools to design new and innovative public creative installations.

1.2 Motivation

When interactive placemaking becomes central to urban design initiatives, interaction designers will be called upon as much as architects and artists to design new public places.

Thus the primary motivation behind this thesis is to bridge design practice with design and computing research to build new knowledge around interactive placemaking. Additionally as a member of the faculty at the IIT Institute of Design, I also have to:

- 1) help build field research in design and apply this research to real world applications.

Clients that sponsor research and projects at IIT Institute of Design such as the City of Chicago, Singapore's Urban Redevelopment Authority, the Chicago Architecture Foundation, Motorola Mobility (now a subsidiary of Google) all benefit from such research as well as these "experimental" applications. It informs them of what is possible and hence enables to contract design consultancies such as IDEO, Gravity Tank, IA Collaborative, Moment, and Gensler to help build these new urban places.

- 2) introduce students of design to new models of placemaking and computing research.

Teaching frameworks to students enable them to further add to the field by building innovative placemaking installations or extending the research. The students often take up leadership positions in organisations upon graduation; at that time

frameworks that they pick up in school are transferred to others and lead to dissemination of the knowledge.

1.3 Research Positioning and Intended Audience

Given the above motivation, this thesis is intentionally positioned at the intersection of design and computing. The thesis builds on the work of others in both of these fields while also contributing to the fields through the construction of new knowledge. The intended audience includes but is not limited to:

- 1) HCI researchers interested in the design of urban interactive installations.
- 2) Designers and design firms that work on urban placemaking projects.
- 3) Urban Agencies such as the City of Chicago, Chicago Loop Alliance, Singapore Urban Redevelopment Authority that work on urban placemaking initiatives in these cities.
- 4) Design and computing students interested in learning about interactive placemaking.

1.4 Research Questions

The primary premise of this thesis is that users' behaviours in public spaces can be observed, abstracted, and formalised into frameworks which designers can use for the generation and evaluation of future public creative installations. There are of course many disparate theories and frameworks already available to designers. But many of these are difficult to appropriate into the design process. Making a framework accessible and usable by others besides the researcher creating it is a big challenge (Rogers 2012) as many researchers find them either too difficult to follow, too complex or not a good match to their design problem. To address this, the thesis builds on existing work, synthesizing and refining them to make them more usable in terms of one comprehensive framework. The goal was to iterate, refine and validate

the framework so that it is usable, accessible and understandable by students and designers alike.

Based on this, the three main research questions this dissertation seeks to answer are:

- 1) What insights can be derived from observing users engaged in public interaction?
- 2) How can these insights be abstracted into a framework to inform the generation and evaluation of new interactive public installations?
- 3) Can and will designers employ such frameworks for the design and evaluation of interactive public installations?

Chapter 2 will show the research methodology adopted to answer these questions and describe in detail the *research by design* method employed. Chapter 3 presents a critique of existing literature on placemaking, interactivity and space, as well as building on existing research that has been done within design and computing communities around interactive installations. This chapter concludes with a discussion about frameworks and how frameworks are useful for designers.

Based on the literature reviewed, a framework for interactive placemaking is proposed in Chapter 4. At this point, the methodology will iteratively dovetail between in-the-wild user studies and abstraction. This continues incrementally through three sets of studies, each study validating and evolving the framework to be more usable by designers and architects. This framework is first used as the basis for the evaluation of two urban installations in the city of Chicago. Chapter 4 describes the two case studies as well as observations and insights used to extend the framework.

The extended frameworks are described in Chapter 5 and used as the basis for the design and evaluation of a controlled public installation. Chapter 6 presents a larger scale real world

implementation done in the city of Chicago as well as the observations and insights derived from the study. These chapters are important because they show how the framework can be employed in generative and evaluative fashions.

This is followed by chapter 7 which describes how the evolved framework was employed by students in a design workshop to build three installed urban interactive installations. Nine students who were part of the workshop are interviewed in the chapter. Insights from Chapters 5, and 6 as well as observations, interview, and exercises conducted with design students in Chapter 7 lead to a reframing and evolution of the framework.

Chapter 8 discusses the final frameworks in detail. A two level framework for interactive placemaking is proposed, and is the main contribution of this thesis. This chapter also demonstrates how the framework can be used by designers for the design of interactive public installations.

Finally, Chapter 9 concludes the thesis with a description of the contributions and limitations of the four studies. This chapter will describe current and future work at IIT Institute of Design that builds on the research presented in this thesis.

Chapter 2. Research Methodology

The following chapters will demonstrate a methodology which employs prototypical scenarios as anchors on which user observation studies are conducted. These observations were used to develop new insights, and then a new prototypical installation designed to test these. The flexibility of a prototypical installation is crucial as it carries in itself the ability to be quickly modified and redefined. The intention here was to observe and understand user behaviour in the prototype environments, not to look for solutions. In particular the interest lay in basic behaviours that augmented, enhanced, and/or successfully completed a creative engagement. Changing aspects of the prototype to respond to/trigger behaviours enabled deeper understanding of what factors influence creative engagement. A combination of such modulations and redefinitions – what changes triggered what behavioural response – how the participants reacted to the different modulations provided the direction for comprehensive design frameworks.

Such a methodology is often referred to as *research through design*, particularly useful for phenomenology based research (Zimmerman, Forlizzi, and Evenson 2007; Bowers 2012). Research through design projects derive insights and future directions by studying user engagement within designed prototypical scenarios. The methodology also borrows heavily from the Analysis-Synthesis Bridge model of design (Dubberly, Evenson, and Robinson 2008), accepted by many as the simplest way to describe the process of design research (Buxton 2007; Kelley and Littman 2001) and a common framework used widely in design. In the model, the authors propose that having agreed on a model of what is (framed the current situation, defined the problem) then the other side of the frame (the preferred future, the solution) is implied. Thus the Analysis-Synthesis model moves iteratively and quickly along two spectrums – Know (understanding users and context) to Make (designing prototypes to test this

understanding); and Abstract (rapidly modeling experiences from these studies) to Real (developing implementation plans or in this case, the family of frameworks).

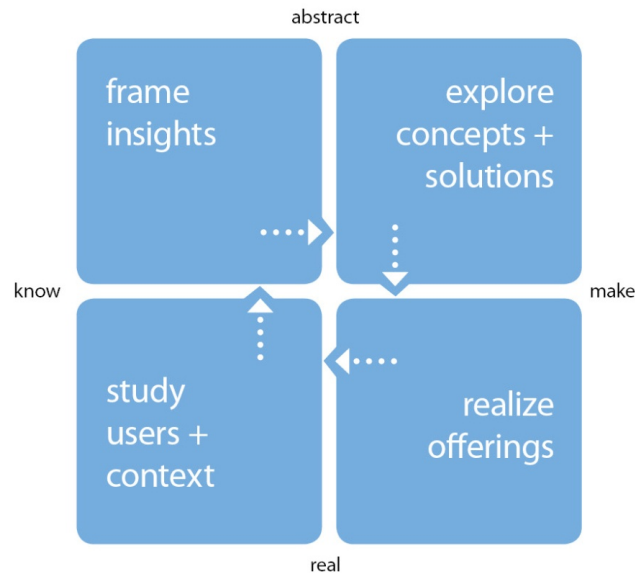


Figure 2.1 The analysis-synthesis bridge model

Based on this model, there were seven components to the *research through design* methodology adopted here. Each component is explained in detail below:

Research

Initial research involved the review of current empirical work and user observation studies that look at embodiment and user experience in interactive environments. In this phase, the intention was to look at existing literature and derive basic theoretical and practical elements that can be used to build a framework.

Analysis

In this phase, information from the previous phase was used to describe interactive placemaking and frame insights about user behaviour at interactive environments. A basic framework was developed at this stage.

Prototypes

Prototyping embodies a form of problem solving inherent to design. Engaging prototyping in the process of design allows designers to create numerous generative, evaluative and narrative schematics of the final product, each adding to the design of the product.

Prototyping allows us to learn through reflection and grow comfortable with that notion inherent in the prototyping process: "fail often to succeed sooner." Several authors have recently extolled the importance of prototyping in the design process. Buxton (Buxton 2007), for example, talks about the importance of sketching, early prototyping, and user observation as important to the dynamic nature of interaction design and research. The use of prototypes and user observation methods in combination is not new to the field of HCI or design – researchers (Brignull and Rogers 2003; Randell et al. 2004; Gaver et al. 2004; Bilda, Edmonds, and Candy 2008) have always employed "in the wild" prototypes to study user behaviour and frame insights.

In this research, a number of interactive installations were prototyped. The frameworks derived from studying one prototype was then used for to design subsequent prototypes. Each prototype was deployed, user behaviour around the prototype examined, the behaviours analysed to derive insights, and key insights used for the evolution of the final framework. Hence, the framework from one study was used as an input framework for the next study, enabling it to lead to the evaluation of user engagement in the next study.

User Observation and Redefinition

Once the prototypes were designed and installed, interaction and engagement were observed using three formats:

- 1) fly-on-the-wall observations – these are studies where the researcher does not enter into the prototype but rather observes activities and behaviour from afar.

- 2) intercept interviews –these are informal studies where the researcher might temporarily enter into the prototype to query participants about a specific activity or behaviour.
- 3) and semi structured interviews – these are formal studies where the researcher invites participants to interview sessions to discuss a certain set of activities or behaviours.

These methods were employed to specifically look at how people interact with the installations, what people say, and how people react with other people at the installation. The idea was to observe what happens, listen to what is being said, and conduct naturally occurring conversations with the parties involved.

A combination of these methods/tactics were used to:

- 1) understand user behaviour from an external point of view and gather broad insights about overall behaviour patterns.
- 2) as well as understand user experience from the user’s point of view and gather specific insights about how specific users approach public interaction.

The collected data comprised primarily of notes, sketches, audio recordings, photographs, and videos derived from the participant observation and interviews.

Evaluation

An important aspect of this research is the applicability and use of the frameworks in the wild for actual interactive environments. To test the applicability and usability of these frameworks, a 16 week workshop class at the IIT Institute of Design were used as a test environment. The frameworks were presented to 20 graduate students of design in the workshop. Students were encouraged to employ the frameworks in the design and evaluation of four real world urban interactive installations. How students employed the frameworks in the process was observed

and categorised. Students were interviewed to find out how valuable the frameworks were for the design of the projects. “Think-aloud” and card sort studies were also used to help students describe their experience in using the frameworks.

This phase verified the validity of the frameworks and their applicability in the design process. It led to a reframing and eventually to the evolution of the initial set of frameworks.

Synthesis

Synthesis comes at the end of the research cycle. In this phase, lessons and insights from both the user observation studies and the evaluation studies were used to define conceptual and practical frameworks for interactive placemaking. This phase weaved together all aspects of the research – literature review, empirical study, user observation, and application.

This phase led to a clear understanding of:

- 1) the definition of creative engagement
- 2) the importance and validity of embodiment and interaction in public creativity
- 3) frameworks for the generation and evaluation of interactive placemaking
- 4) applicability of these frameworks as generative and evaluative mechanisms in the design of urban interactive installations.

The following is a diagrammatic representation of the methodology. It shows the process by which the research methodology was conducted.

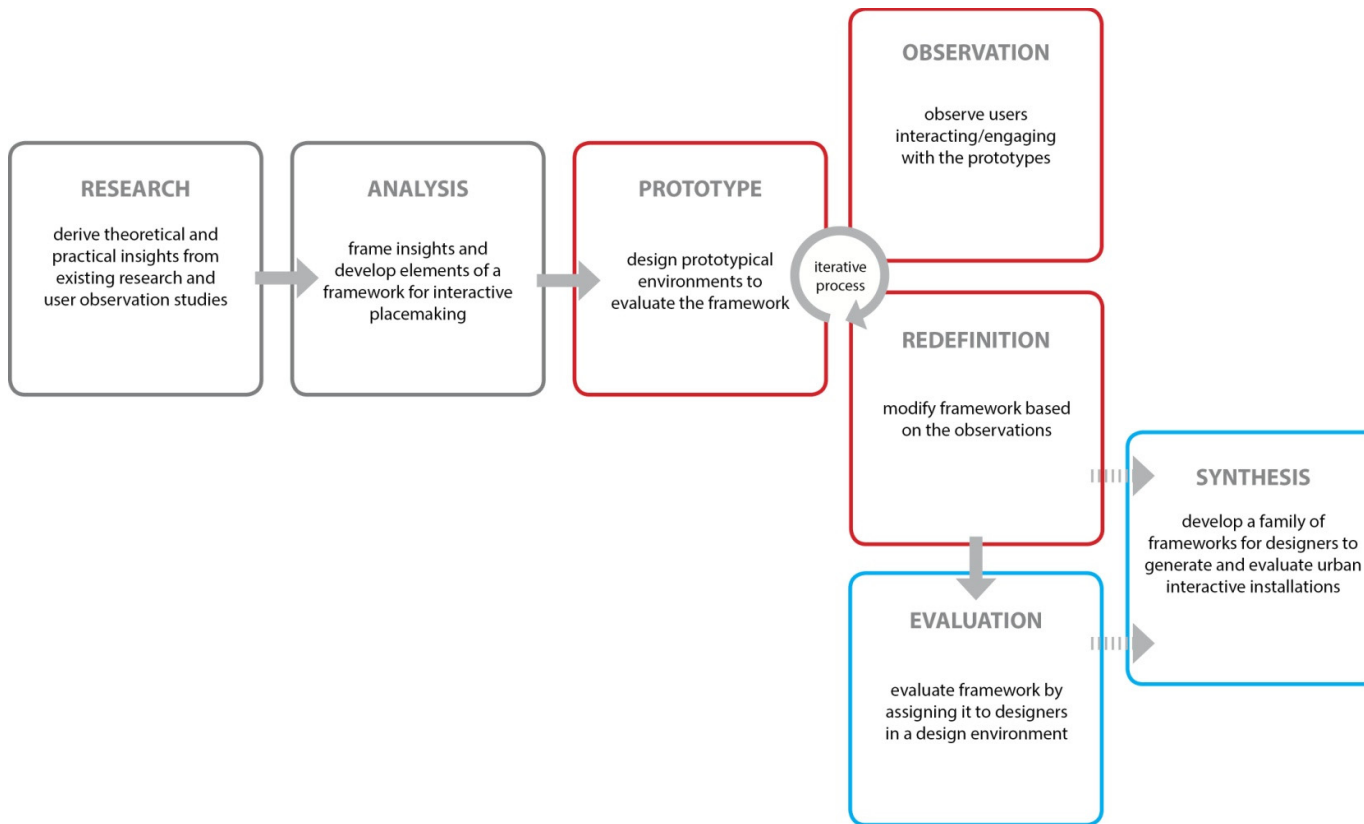


Figure 2.2 A diagrammatic representation of the research methodology employed

Chapter 3. Literature Review

This thesis positions “interactive placemaking” as a key design element of new urban environments. It is thus important to understand placemaking from the context and background of existing literature and research. In this chapter, placemaking is evaluated from three points of view – conceptual: where does placemaking evolve from and what are the constructs that make it work; philosophical: why is placemaking important for urban and interaction design; and finally technological: what role does technology, user experience, and design play in the future of interactive placemaking installations.

“Placemaking” is a concept derived mostly from seminal work of Jacobs in the 1960’s and Whyte in the 1980’s. Both of these researchers looked at how people interact with space (Jacobs 1961; Whyte 1980), shifting the focus of urban planning from a discussion about infrastructure and transportation to a discussion about the users that inhabit the spaces. Following the work of Jacobs, publications such as *The Image of the City* (Lynch 1960) and *A Pattern Language* (Alexander, Ishikawa, and Silverstein 1977) still continues to influence research in placemaking within urban design and architecture. *The Image of the City* presents a study which lasted over five years, where Lynch studied users in three major cities – Boston, New York, and Los Angeles and described how users perceive and organize spatial information as they navigate through cities, as well as how users tend to organize their cities in consistent and predictable ways. Five elements were highlighted: paths, channels in which people travel; edges, perceived boundaries such as walls, and shorelines; districts, relatively large sections distinguished by some identity or character; nodes, focal points or intersections; and landmarks, readily identifiable objects which serve as external reference points. In this publication, Lynch also coined the term “wayfinding” – a technique by which designers can help people orient themselves within physical space and move from one space to the other.

Alexander's work (Alexander 1964; Alexander, Ishikawa, and Silverstein 1977) proposes that the design of architectural and urban spaces can be thought of as an overlapping of patterns of organisation. In this book, he introduces three basic design principles for space planning – *vocabulary*, *syntax*, and *grammar*. While these principles are designed to resonate with the basic structure of any language construct, in the case of spatial planning, Alexander defines *vocabulary* as a collection of named, described solutions to problems; *syntax* as one or more descriptions which enable these solution to fit into a larger, more comprehensive system; and *grammar* as how this combination of vocabulary and syntax solves the problem or produces a benefit to users. In addition, Alexander also proposes that the combination of each of these into one solution is a pattern created by a designer, and that these patterns are not only recognisable, but also repeatable. In fact he argues that the entirety of architectural design can be reduced to a set of “computable” patterns.

From the point of view of this thesis, both *The Image of the City* and *A Pattern Language* have had significant impact on placemaking. Operationalising people's mental models into “designable” elements was the methodological approach adopted for placemaking. Project for Public Spaces (PPS 2012) extends the work of Jacobs, Whyte, Alexander, and Lynch by taking their research in an “actionable” direction. They claim that urban agencies can take active steps to ensure that placemaking endeavours have significant effect on lived experiences within the communities they work in:

Placemaking is a multi-faceted approach to the planning, design and management of public spaces. Put simply, it involves looking at, listening to, and asking questions of the people who live, work and play in a particular space, to discover their needs and aspirations. This information is then used to create a common vision for that place. The vision can evolve quickly into an implementation strategy, beginning with small-scale, do-able improvements that can immediately bring benefits to public spaces and the people who use them. (website p.1).

The Metropolitan Planning Council² (MPC) adds another element to this methodological approach. MPC works with the Project for Public Spaces (PPS) to disseminate these ideas within communities in Chicago. To do so MPC and PPS offer a eleven step guide for the placemaking process (PlacemakingChicago 2012).

- 1) The Community Is The Expert
- 2) Create a Place, Not a Design
- 3) Look for Partners
- 4) You Can See a Lot Just By Observing
- 5) Have a Vision
- 6) Start with the Petunias: Lighter, Quicker, Cheaper
- 7) Triangulate
- 8) They Always Say “It Can’t Be Done”
- 9) Form Supports Function
- 10) Money Is Not the Issue
- 11) You Are Never Finished

² The Metropolitan Planning Council is a greater Chicago based organisation that works with communities and urban agencies to develop Placemaking strategies. They are an independent, nonprofit, nonpartisan organisation developing, promoting and implementing solutions for sound regional growth. See <http://www.metroplanning.org/index.html>.

Urban designers, planners, and agencies actively appropriate these steps in the process of place planning. Perhaps the most famous project that PPS has completed is building a new placemaking experience for Times Square in New York City³. The project recommendations, proposed in 2006-07 was implemented by the city in a major development of Times Square in 2011. Since then other cities like Boston, Houston, Cleveland, among other cities have incorporated this process into their community planning projects. The success of projects such as the pedestrian friendly Times Square and the highly regarded, heavily publicized High Line in New York City⁴ are testaments to the power of placemaking as an approach for urban design.



Figure 3.1 Placemaking on Times Square. The project converted a primarily vehicular access into pedestrian walkways and seating.

³ <http://www.pps.org/projects/timessquare/>

⁴ <http://www.thehighline.org/>

3.1 From placemaking to interactive placemaking

Over the last decade however we have seen a significant change in the way users have appropriated technology into their everyday lives. In the US for example a recent survey by the International Association for the Wireless Telecommunication Industry (CTIA) showed that 91% of Americans use cellphones⁵. The same survey showed that 257 million "data-capable" devices are active on US carriers' networks. As the urban user becomes more connected, social practices will also evolve. Ito et al. in the John D. and Catherine T. MacArthur Foundation Reports on Digital Media and Learning (Ito et al. 2008) highlight the social aspects of social media and its ability to enable peer based learning. Their report point to two specific ways children use the internet to learn - most youth, they claim, use online networks to extend the friendships that they navigate in the physical environments of school, religious organisations and activities like sports, and other local activities. These "friendship" networks are "always on," in constant contact with their friends via texting, instant messaging, mobile phones, and Internet connections. A smaller number of youth also use the online world to explore interests and find information that goes beyond what they have access to at school or in their local community. Online groups enable youth to connect to peers who share specialized and niche interests of various kinds, whether that is online gaming, creative writing, video editing, or other artistic endeavors. In these "interest" networks, youth may find new peers outside the boundaries of their local community. They can also find opportunities to publicize and distribute their work to online audiences and to gain new forms of visibility and reputation.

⁵ CTIA is an industry trade group that the international wireless telecommunications industry. Its semi-annual wireless industry survey develops industry-wide information drawn from operational member and non-member wireless service providers. It has been conducted since January 1985. These numbers are from the 2012 mid-year survey, see <http://www.ctia.org/advocacy/research/index.cfm/AID/10316>.

On another front, ubiquitous computing is changing the nature of physical space. Mergers of physical and digital infrastructure mean that more information can be embedded in to seemingly everyday objects in spaces, surfaces, and artefacts familiar to users and yet enable new meaning and creative experiences. The coming of ubiquitous computing signals a paradigm shift in computing research as described by Rogers (2006) – it means that computing can now be embedded into virtually any object, or environment and novel experiences can be conceived. Within urban contexts, the work of several HCI researchers and urban designer-artists show how the adding of the technology layer transforms the urban experience. Take for example the work of Raphael Lozano-Hemmer, a designer who in his installation *Body Movies* to engage an urban audience. This placemaking project saw over one thousand portraits projected using video mapping techniques on the façade of the Pathé Cinema building in Schouwburgplein square in Rotterdam. According to Lozano-Hemmer (2002) the coming together of physical infrastructure and virtual information means the user finds themselves uniquely positioned within the context of the urban space, realizing that they have the power to effect change on this space.

As soon as people walked on the square, however, their shadows were projected on the building and the portraits were revealed within them. Passers-by could move around and match the scale of a portrait by going toward or away from the building, making their silhouettes between 2 and 22 meters high. A camera-based tracking system monitored the location of the shadows in real time and, when the shadows matched all the portraits in a given scene, the control computer issued an automatic command to change the scene to the next set of portraits. This way the people on the square were invited to embody different representational narratives. Over 50 people could take part at any given time, controlling 1,200 square meters of projections and creating a collective experience that nonetheless allowed discrete individual participation.

(p.1)

Lozano-Hemmer offers a perspective about his work which is poignant to note here. He claims:

My work is best situated somewhere between architecture and the performing arts. For me it is a priority to create social experiences rather than to generate collectible objects. The making of a piece itself is closer to developing a performance or a play than a visual artwork...You have this frame and you step back from the subject, from reality, as though looking through this neutral glass...[In my work] spectators play an active role, not a passive one. People who are participating are in fact reflecting. People are not innocent when they activate interactive works in a public space, and this already constitutes a certain ground for reflection. People are participating in these sort of interactive operations with a lot of knowledge and awareness. (p2, 3).

Similar claims can be made for many new urban installations (O'Hara, Glancy, and Robertshaw 2008; Snibbe and Raffle 2009; Reeves et al. 2005; Peltonen et al. 2008; Hornecker 2008). The projects described in these papers all augment the urban experience by introducing a level of interaction into the experience of place. Unlike placemaking experiences which only rely on infrastructural changes, these installations incorporate technology mediated user interaction as the means to unfold the place experience. Clearly, this new confluence of media, mobile/ubiquitous computing, and a participative urban citizenry offers new opportunities and methods for urban planning agencies to engage the urban audience. It is this introduction of technology and interactivity into place experiences that is henceforth referred to as "interactive placemaking".

3.2 Theoretical frameworks for interactive placemaking

While Interaction Design literature is somewhat limited in terms of methodological approaches to interactive placemaking, the concept of space, place, and its impact on human cognition are commonly explored themes. Of relevance to this new way of thinking about public installations are concepts of space, place, and its impact on human cognition. For

example, several oft-cited authors (Harrison and Dourish 1996; Mitchell 1996) provide the rich theoretical background for place based research, laying ground for newer proposals (Harrison, Sengers, and Tatar 2011; Dourish 2004; McCullough 2004). In fact, as early as the 80's Lucy Suchman (1987) claimed that within newer forms of interaction the source of meaning is located in the action of situated actors. Human actors, Suchman claims, derive their meaning from their situated encounters within an interactive context and emergent goals. This idea has been explored in depth by Dourish (2004). His book, *Where the Action is*, was one of the first publications within HCI to derive from phenomenological concepts in philosophy, design, and architecture to describe how embodiment is critical to the understanding of interaction and eventually the design of interactive systems.

More recently, a new approach has been proposed for HCI where embodied engagement forms the basis (Harrison, Tatar, and Sengers 2007; Harrison, Sengers, and Tatar 2011); the authors call this the "Third Paradigm of HCI". According to the authors, the first paradigm of HCI looked at interaction as a form of man-machine coupling in ways inspired by industrial engineering and ergonomics. In this the paradigm, HCI was mostly concerned with identifying problems with the coupling and generating solutions that allowed the user to interact with the computer. The second paradigm that followed it, took on board the metaphor of mind as computer, and as an information processor. It adopted largely a "cognitive" approach, being concerned with identifying information processing problems within users and computing systems, for example:

'how does information get in', 'what transformations does it undergo', 'how does it go out again,' 'how can it be communicated efficiently' etc. (2007, p. 4)

In contrast, the emergent 3rd paradigm treats interaction not as a form of information processing but as a form of meaning making in which the artefact and its context at all levels

are mutually defining and subject to multiple interpretations by the embodied actor.

Embodiment is a key aspect of interactive placemaking. The user engaged in a placemaking experience is not only engaging with the installation but also inhabits and shares the space in which the installation resides. Thus because the actor shares corporeity with the environment and the installation. Just as much as the environment and the installation has it can be claimed that the actor actions are a result of embodied engagement.

3.3 Embodied Engagement

Embodied engagement basically suggests that this shared corporeity with environment makes it no longer an object but an equal participant in a process of perception and experience. Any engagement in place is a result of our experience with the artefact itself, as well as the artefact as it resides in the environment.

According to Rohrer (2005) embodiment can be defined as:

...the social and cultural context in which the body, cognition, and language are perpetually situated...the context can include cultural artefacts that aid and manifest cognition - many of which are not only constrained by but are also extensions of the body. 'Embodiment' has a phenomenological sense in which it can refer to the things we consciously notice about the role of our bodies in shaping our self-identities and our culture through acts of conscious and deliberate reflection on the lived structures of our experience [referring to Brandt - Domains and the grounding of meaning; and Metaphor, catachresis, simile: A cognitive and semiotic approach and an ontological perspective] (p.7)

The conceptual underpinnings of embodied engagement can be traced back to the work of philosophers such as Husserl, Heidegger, and Merleau-Ponty. Merleau-Ponty's book *Phenomenology of Perception* (1945) was seminal to the development of the embodiment hypothesis. The hypothesis was designed to supersede what was the then accepted and

common theory of engagement of *Cartesian duality*. Cartesian duality stems from the Renaissance where problems within geometric and mathematical reasoning were considered as knowledge which is disembodied - fundamentally independent of any particular bodily sensation, experience, or perspective. It is derived from Descartes' famous phrase "*cogito ergo sum*" (*I think, therefore I am*), reflecting the idea that we inhabit two different and separate worlds – one the world of the mind, or experience, and two the world of the body, or physical reality (Dourish 2004).

Merleau-Ponty suggests that perception cannot be considered in its entirety if the body and mind are separated. Instead he proposes that perception is a constant and unfiltered flow derived from the body and mind situated in the middle of world full of sensation. Any engagement in this context is a composite experience that requires both the body and mind to work in tandem. While this movement away from Cartesian duality is very recent, it is an important line of thinking for interactive placemaking. It suggests that experiences have as much of a role in shaping the embodied interactions of the human actor as they do cognitive interactions and physical infrastructure.

This thinking is presented also by Marshall McLuhan (1988) who compares the situation of media and technology in a socio-cultural context to Gestalt psychology of 'figure-ground relationships'. In this comparison McLuhan asserts that to fully grasp the effect of a new technology; one must examine the technical artefact as the figure (medium) and the socio-cultural context as ground (context). Not only must the figure and ground be evaluated together, but also as a critique to one – another. In particular this is important since neither is completely intelligible without the other. In terms of placemaking, environmental psychology categorises "physical environment" as "typically neutral," only coming into self-conscious awareness when individuals form stable and enduring representations of it from memory and

experience (Auburn and Barnes 2006). Recent work by Tuan (1974, 2001) takes this further by introducing the idea of *topophilia* - the emotional connections between physical environment and human beings. In his work, physical environment is described as two layers – one a structural layer, which Tuan refers to as *space* and the other an emotional layer, which he refers to as *place*. Tuan claims that while cross connections may exist between these two layers, they are significantly different from each other.

3.3.1 Space and Place

What is the difference between space and place? The following is an example to explain the connections between our memory and space:

“Isn’t it strange how this castle changes as soon as one imagines that Hamlet lived here? As scientists we believe that a castle consists only of stones, and admire the way the architect put them together. The stones, the green roof with the patina, the wood carvings in the church, constitute the whole castle. None of this should be changed by the fact that Hamlet lived here and yet it is changed completely. Suddenly the walls and the ramparts speak quite a different language...” - Niels Bohr to Werner Heisenberg at Castle Kronberg (Tuan, 1977, p.4)

Simply put, “place” is an appropriation of experiences, while space is merely the construct that envelopes it. Space is the four walls that encompass us, the geographic location – *this is where my house is located, this is a coffee shop*. Place is the emotional context we associate with these four walls – *this is my home, this is where my wife and I met*. McCullough (2004) presents the idea of place as integral to the idea of the design of architecture; it is the phenomenological quality of space that enables us to retain memories, weave stories, and describe our experiences. Thus, the design of space is the design of structural elements that encompass place, while the design of place is the design of an interaction between humans and their environment. This distinction of space and place was critical to the early work in HCI leading to seminal papers by Harrison and Dourish (1996) and Dourish’s subsequent critique of

the same work (2006). Although Harrison and Dourish point attention to the importance of space and place in HCI research, they themselves do not present any tactical or methodological mechanisms by which designers can use the idea. A recent reading (Ciolfi and Bannon 2005) of the seminal works by Tuan however presents a slightly more nuanced stance. In this paper, Ciolfi et al. suggest that “place” is more than just a location by describing how place is inextricably linked to people and meaningful activities in that location. Place, they claim, is a composite of many layers of human experience: sensory perception, memories, feelings, social connections and the presence of others, cultural rules and conventions.

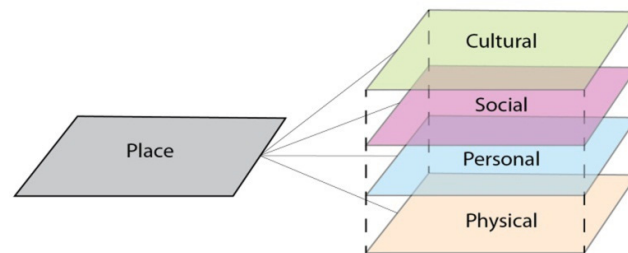


Figure 3.2 Ciolfi et al.’s unpacking of “Place”

A visual rendering offered by Ciolfi et al. shows how “place” can be unpacked into social, political, personal, and physical attributes that a user brings to that location. These dimensions they claim do not exist as a series of abstract categories, but emerge through people’s actions and activities, practice and experience, and memories in locational space. This is in synch with Harrison and Dourish’s (1996) argument that “*spaceless place*” cannot exist, as sense of place can only emerge through physical immersion within a space. Rohrer’s (2005) reading from Merleau-Ponty (1945) provides another interesting way to think the manner in which infrastructure can provide deep connections to the body of the situated actor. He claims that embodiment is the social and cultural context in which the body, cognition, and language are

perpetually situated, a context which include the user, cultural artefacts, and physical infrastructure – space, technology, computers, displays, motion sensors, all of which aid and manifest cognition. This infrastructure according to Rohrer is not independent of the engagement but should be seen as extensions of the body which is interacting. Thus, actors interacting with an environment or interface essentially derive their experience from not only their own situation, but also the situation of the interaction or the object of interaction.

Consider this thought experiment - imagine a pile of bricks placed in two separate contexts of situation:

- 1) In the first context, the installation is placed in a construction site, say in the middle of a city. In this situation, the installation may seem as though it is part of the construction project. A brick out of place is not an unusual sight and hence embodied actors may choose not to stop, engage, or even think about it.
- 2) In the second context, the same installation is placed in a museum: In this situation, the installation is seen by embodied actors as something to be interacted with or at least reflected upon. Its situation within the context of an exhibition presents questions - Why is that brick out of place? What message is the artist trying to send to us?

Clearly, a pile of bricks is insignificant in the larger of order of everyday experiences. Its significance in this case, comes from its situation, the embodied actor, and the relationship between the two.

3.3.2 Subject-Object Relationships

If our situational sensibility is constructed from memories in locational space, the revival of these memories must be triggered by our response to the recognition or construction of

objects within the same space. Such relationships need not be singular in nature. In cognitive linguistics for example, several scientists have made the claim of variability of the complex relationships users establish with objects. Take for example this thought experiment by Langacker (2002):

Consider the glasses I normally wear. If I take them off, hold them in front of me, and examine them, their construal is maximally objective...they function solely and completely as the object of perception, and not at all as part of the perceptual apparatus itself. By contrast, my construal of the glasses is maximally subjective when I am wearing them and examining another object, so they fade away from my conscious awareness despite their role in determining the nature of my perceptual experience. The glasses then function exclusively as part of the subject of perception - they are one component of the perceiving apparatus, but are not themselves perceived... (p. 316)

Dourish (2004) refers to such subject-object relationships as *coupling* – the manner in which intentional references are made such that we can build up and break down relationships between entities.

...the hammer moves from being ready-to-hand to present-at-hand; that is, from being employed within the action of hammering as an almost “invisible” extension of my arm to become more immediately present and “visible” as an object of focus and attention...When the hammer is present-at-hand, it is separate from me, while in the ready-to-hand case, my arm and the hammer feature as a single unit in my activity; they are coupled. (p.139)

This concept of “ready-to-hand” and “present-at-hand” provides a conceptual framework on which all designed objects and spaces can be made. The building up and breaking down of such *coupling* relationships define our interactions with these designed objects and spaces. It also suggests the notion that any designed technology exists at once in two realms – one, as the object of our attention, and second, as an extension of our body. This notion resonates

with the work of Marshall McLuhan whose definition of technology is any human endeavor that can extend the ability of the human body. Thus television is an extension of our eye, the radio is an extension of our ear, the locomotive or automobile is an extension of our leg, and the computer is an extension of our mind (McLuhan 1964/2003).

What is the role then of the designer? It can be proposed that the designer in this case not only designs the technology (the focus of our attention) but also the extension (the interactions that make the technology an extension). Dourish derives his idea of *coupling* from Martin Heidegger's critical essay on "modern" technology - *The Question Concerning Technology* (1954/1977). In this essay, Heidegger offers a way to differentiate how a designer might approach the instrumental characteristics of technology differently from the essential nature of technology.

The word [technology] stems from the Greek Technikon means that which belongs to techné...techné is the name not only from the activities and skills of the craftsman, but also for the arts of the mind and the fine arts. Techné belongs to bringing-forth, to poïesis; it is something poetic.

From the earliest times until Plato the word techné is linked with the word épistémè. Both words are names for knowing in the widest sense. (p.12)

The key concept Heidegger presents in this essay is that every object in our lived environment is constructed for us (or our perception) through four causes. According to Heidegger, the four causes are: (1) the *causa materialis*, the material, the matter out of which, for example, a silver chalice is made; (2) the *causa formalis*, the form, the shape into which the material enters; (3) the *causa finalis*, the end, for example the sacrificial rite in relation to which the chalice required is determined as to its form and matter; (4) the *causa efficiens*, which brings about the effect that is the finished, actual chalice, in this instance, the silversmith.

The first cause is essentially the material of the object. This material has inherent properties that influence the construction of the form; as he explains - the silver from which a cup is made has certain properties which are exhibited within the cup itself.

This is different from the form of the object, which is the second cause. The form, which although is dependent on the material, gives the cup specific characteristics that makes it recognisable to us as a cup.

The third cause is perhaps the most important in the context of this discussion – it is the end or the purpose to which the cup will be used. As an example, a cup that is used for communion in a church will carry a different contextual connotation (to us) than a cup used at the dinner table in spite of the fact that both of them hold wine.

It is important here to note the several layers of complexity that are built into this discourse. The first layer is an understanding of the technical aspects of material, form, and use. This is often self-evident through the actual manifestation of these causes in objects of perception. In addition there is also an epistemological layer which Heidegger uses in the construction of context. This is “knowledge” of material, form, and use. In terms of the silver cup – users are able to construct an understanding of a silver cup (any silver cup) through knowledge of what silver is (hyle), what a cup is (eidos), and what the use is (poïesis).

Finally, there is the fourth cause, which Heidegger views as instrumental, one which brings the three preceding causes together:

The silversmith [or in this context of this discussion, the designer] considers carefully and gathers together the three aforementioned ways of being responsible and indebted. The three previously mentioned ways of being responsible owe thanks to the pondering of the

silversmith for the "that" and the "how" of their coming into appearance and into play for the production of the sacrificial vessel.

They differ from one another, yet they belong together.

And thus it is coming together of the three causes of the object that essentially forms the context for interpretation – its material (construction), its form (the manifestation of this construction), and its use (the interpretation of this manifestation).

In Heidegger's essay the designer is the one responsible for bringing these three causes together in the finished format of the object.

Whoever builds a house or a ship or forges a sacrificial chalice reveals what is to be brought forth, according to the perspectives of the four modes of occasioning [see above]. This revealing gathers together in advance the aspect and the matter of the ship or house, with a view as to the finished thing envisioned as completed, and from this gathering determines the manner of its construction.

Through this reading, it is clear that the design of a placemaking installation is a complex endeavour, one that consists of not just the design of technology, but also the situation of it in a context, users' experience with it, as well as the design of the connections between technology, context, and users. Pragmatist philosophers like John Dewey (1934) describe this complexity by introducing the concept of Aesthetics. Aesthetics, according to Dewey, is the perception of the world - created not *ex nihilo*, but re-lived from precedents. The aesthetics of an artefact, for example, are not inherent in it, but are derived from an understanding of the socio-historical dimensions associated with it and memories associated with its use. The basic premise here is that experiences are not unique temporal instances defined by an interaction with an object but a complex build-up of all prior experiences. Our experience with an artefact (be it architecture, design, product or technology) is different every time we interact with it.

(Even) the first time we interact with this artefact, we bring to that interaction, memories of past experiences. This describes and influences our perception of the artefact. After the first interaction, we step away from the artefact and interact with the rest of the world. While we are immersed in our socio-cultural context, that too is changed because of our interaction with the artefact. Every subsequent interaction with that artefact is different from the first because our perception of the world has been changed by our experience of the artefact and its presence in our life. And because our ability to engage in an experience is the result of such social contexts and our own intellectual abilities, the manifestation of an aesthetic experience is prolonged beyond the immediate exposure.

Extrapolate this premise into the design of a common artefact, say a chair; the aesthetics of a chair is not defined merely by its design; instead it is defined by our understanding of the design. The chair itself does not carry any aesthetics; it is derived from perception, through a constant revival of a history of past experiences and memories of what a chair looks like (or should look like). In the end, an understanding of the aesthetics of a chair is subjective and ambiguous because different 'aesthetics' of the chair are based on interpretations.

Furthermore, the aesthetics of the chair lingers beyond the singular instance of our interaction with it. It is carried forward to the next instance of interaction with another chair. This is why beyond the mere ascribed use that is afforded by an artefact, aesthetics has the ability to surprise and provoke and to move the user to a new insight of the world (Petersen et al. 2004). An object of interaction gains meaning only from its situation, how it is designed to be connected to other artefacts, events, and the perception of the user. It cannot be expressed in quantifiable terms, in one visitation or use. Instead aesthetics must be lived over and over again through experience. Thus a designer when designing a chair concentrates less on the design of the chair and more on the sublime experience of interacting with the chair. In the

end, what the designer has designed is not the chair itself but pervasive influence of the chair on the user's perception of the world, or the user's experience with that chair.

A similar experience is true for place based interaction as well. Place is not experienced from the singular current visitation but from the variety of place memories that the user has accumulated over his or her lifetime. When embodied in a place experience, the user extrapolates from multiple past experiences to create an understanding of what is expected, what is at stake, and how the interaction might unfold. It is for this reason that designers cannot remove the process of designing an artefact (or in this context, a place) from the process of the designing its use, especially within the context it will be situated in or the user experience. Designers who design interactions in place cannot simply build the technological aspects of the installation, but must also construct, based on assumptions of constant building and breaking down, what user experience at the installation might be like. User experience thus becomes another key element for design consideration.

3.4 User Experience

Defining experience is difficult, because people can never step out of their experiences and look at them in a detached manner (McCarthy and Wright 2004). When someone experiences something, they often use all five sensory organs as well as thinking and memory. An experience is lived in the moment; it is relived over and over through narratives and stories - a process where we define others' experiences through our own memories and perception. User experience on the other hand differs from experience in the sense that it defines one trajectory of an experience through any given scenario or interaction with a product, service or system. Within HCI and design, the *user experience* is often defined as a user's journey - emotional, physical, and perceptual - during such interactions. In Preece et al.'s seminal textbook, they claim that the user experience is *how a product behaves and is used by people*

in the real world. More specifically, it is how people feel about a product, and their pleasure and satisfaction when using it...this includes their overall impression of how good it is to use, right down to the sensual effect small details have on them such as how smoothly a switch rotates, or the sound of a click, and the touch of a button when pressing it (2002).

This makes it possible for designers to design *for* user experience. For example, if asked I can externalize and describe my journey through a store like Walmart in terms of what I see, what I touch, the temperature in the store, my immediate reaction to my fellow shoppers and so on. With this information, it can be argued that the user experience can both be defined and modeled. We find that the user experience is often described in qualitative and metaphorical terms, and that several researchers have developed models of the user experience in terms of abstractions and frameworks (Norman, Miller, and Henderson 1995; Nielsen 2000; Buxton 2007). These models allow for designers to make predictions of how users might behave in other similar environments. The user experience is seen as the cornerstone of user centered design. And so in almost all disciplines, such as philosophy, design, architecture, computing, and business, researchers have both tried to extend this definition by describing and modeling the user experience in many different ways.

There following are four different points of view nuanced in different disciplines. There are of course many different models for user experience, but these are the ones considered important for this thesis. These four points of view were chosen because they present user experiences based on different subject-object relationships in fields associated with the thesis. Any future reference within the dissertation to “user experience” will refer to one of these four models.

In HCI, Forlizzi and Battarbee (2004) categorise experience into three unique types. This categorization is based on *the perception by the subject*:

- 1) *Experience*: Experience is how user constantly assesses goals relative to the people, products, and environments around them, such as walking in a park, doing light housekeeping.
- 2) *An experience*: An experience has a beginning and an end, and often inspires emotional and behavioural changes in the person who experiences, such as going on a roller coaster ride, watching a movie.
- 3) *Co-experience*: Co-experience is about user experience in social contexts. Co-experience takes place when experiences are created together, or shared with others, such as interacting with others at a museum, commenting on a friend's remodeled kitchen.

In Business, Pine and Gilmore (1999) categorise experiences into four types based on *the context offered by the object*:

- 1) *Entertainment*: The connection of the participant is more likely one of absorption than of immersion: watching television, attending a concert.
- 2) *Education*: The experience involves more active participation but participants (like students in a lecture) are outside the event rather than immersed in the action: attending a class, taking a ski lesson.
- 3) *Escapist*: These can be like the above two but involve greater participant immersion: acting in a play, climbing Mount Everest.

- 4) *Esthetic*⁶: Here the participants are immersed in an activity but they themselves have little or no effect on it: a tourist who views the Grand Canyon from its rim, or a visitor to an art gallery.

In Architecture theory, derived from Pérez-Gómez's work (2006) are two categories of experiences based on *the spatial relationship between the subject and the object*:

- 1) *Corporeal*: deeming the actual presence of the participant within itself (most architectural experiences are corporeal): living in our homes, walking in the city of London.
- 2) *Voyeuristic*: "visitations," either virtual or physical, to a place or event characterized by its ephemeral quality: visiting a building as a tourist, viewing a city (virtually) on the computer, or (a child) making a spaceship out of a bunk bed.

And finally in Design, Norman (2003) defines experiences based on the *engagement by the subject with the object*:

- 1) *Visceral*: Visceral experiences can be defined as reactions of intuition defined mostly by the basic, biological preferences of human beings created in the process of human evolution. It is about how things look, feel, and sound; for example the Grand Canyon appears beautiful because it triggers an almost automatic intuitive reaction of beauty in one's mind.
- 2) *Behavioural*: Behavioural experiences can be defined as reactions of efficiency defined by our need for things to be functional, to be usable, and understandable. Such experiences are about performance; for example pictograms of the male and

⁶ Used here as written by the authors in US English, means "aesthetic"

female figures on toilet doors allow us to easily discern and understand what happens behind the doors.

- 3) *Reflexive*: Reflexive experiences can be defined as reactions of reflection defined by our ability to bring memory and preferences into what we experience. It is about the meaning of things, about self-image; for example experience of stepping into a Rolls Royce is as much about the cultural and social implications of this action, as it is of prestige and ability.

Since the emergence of the 2nd paradigm, user experience has become a key concept in both design and computing research. Design methodology for experience design is an important aspect of interaction design and ideas of experience design and how experiences can be employed within design and HCI are commonly explored themes (Shedroff 2001; Conifer-Research 2004; Buxton 2007). The above four descriptions of user experience are a valuable frame of reference for placemaking since all of them deal in some manner with the embodied actor in a specific spatial context. As noted above, place based user experiences can be complex and affected by multiple variables. The following sections will look at three significant attributes along which user experience (especially those that are place based) can be modeled. Each attribute provides a tangible aspect of an experience which a designer can use to model user experience. Once modeled, these user experiences can be tested and/or prototyped. The three attributes include *trajectories* which allow designers to design users' experience as they move along the spatial, temporal, and narrative aspects of place based experiences; incorporating *ambiguity* allows designers to develop user experiences that engage the user beyond the immediate interaction; and finally *ludic engineering* brings in the concept of playfulness which allow designers to design experiences that delight users.

3.4.1 Trajectories

Benford et al. (2008; 2009; 2011), in their work, present user experiences in large scale interactive systems through the language of trajectories. Trajectories are defined as journeys steered by the participants, but shaped by narratives embedded into spatial, temporal and performative structures by the designer. The authors claim that within an interactive experience, each participant follows their own trajectory but these trajectories may be shaped and steered, and cross those of others during the experience. Designers have control of four key facets of the system - Space, Time, Roles (which the participants play), and Interfaces. When combined together, these four facets play an important role in steering the user's journey through the experience, in essence structuring the user experience.

Space in this case is the stage on which the user experience is played out. Within interactive engagements space may be physical or virtual or a combination of both. *Time*, according to the author is the temporal contexts in which the experience occurs. This includes the time in which the story is crafted (story time), the order in which the actual narrative unfolds (plot time), the order in which the events are made available to the participants (schedule time), the time in which the participants interact with the story (interaction time), and how participants construct the timing of the story (perceived time). During the unfolding of the experience, the users may undergo several *Roles* from that of a participant to that of a spectator. Users often shift in and out of these roles. The way the users interact with the system is through the user of *Interfaces*. These interfaces are control mechanisms accorded to the user by the designer. They may be in the form of large screens, PDAs, handhelds, toys etc.

A significant aspect of Benford et al's (2011) framework is *how much* a designer can influence the trajectory of a user, and hence affect the user experience:

...there is a fundamental tension between an author's ideal trajectory that is designed into an experience and a participant's actual trajectory, with orchestration being required to resolve the two, enabling participants to temporarily diverge from and reconverge with the preestablished path. (p.715)

Two important terms are presented to describe this control: the term *canonical trajectory* which describes the designer's intended route and *participant trajectory* which describes a participant's actual route.

It is interesting to reflect on which comes first, the experience or the trajectory. Does the artist create a trajectory to shape a subsequent experience or do participants bring coherent meaning to experiences by reconstructing trajectories? We argue both: that trajectories and experiences are in fact deeply interwoven, with the former both shaping and emerging from the latter through a dialogue between artists and participants, usually across multiple iterations of design, experience and reflection...while it may often be desirable to bring trajectories together, it is sometimes equally important to steer them apart, either to avoid competition for limited resources, or to minimize distractions and interruptions. (p.715).

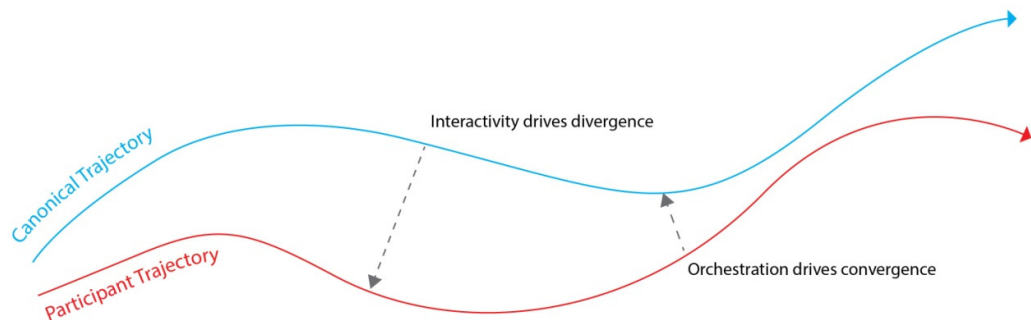


Figure 3.3 Benford et al.'s (2009) representation of a participant trajectory vs. a canonical trajectory.

From the above quote, it is clear that the constant tension that a user experiences in deviating from the canonical trajectory into a participant trajectory is in fact a valuable resource for the

designer. Contrary to the idea that a designer must be in total control of the user experience, this flexibility of the system to accommodate deviations determines the subjective nature of the user experience. By purposefully introducing such ambiguity into the system, the designer is “allowing” users to deviate from the canonical trajectory slightly or quite a bit based on the subjective interpretation of the user at that time in that context. The designer can control these deviations by purposefully crafting elements of the interaction - unfolding of the narrative, the introduction of the interfaces, and the transition of participants from one role to another.

In the design of public place, trajectories play an important role. As an interaction installed in a shared public space, a canonical trajectory defined by the installation may only be a reference point for users. Take the example of the Picasso sculpture in Daley Plaza in Chicago. The sculpture, often known simply as *The Picasso*, is a cubist representation with horse like features. The sculpture because is historically significant because it is the first major public artwork in Downtown Chicago and thus is a well-known landmark. However its *jungle gym-like characteristics* (Artner 2004) allow visitors to Daley Plaza to climb on and slide down the base of the sculpture. This quality of the sculpture may or may not have been designed by Picasso into the sculpture but once in the public realm, it was appropriated it in this manner. And this is often the quality of the sculpture which leads to it being celebrated as an example of an accessible public landmark. It is clear from such examples that place experiences will be derived from the extents to which the installation allows the user to deviate from what has been defined. A key element of design that allows for such interpretation is the ambiguity offered both by form and meaning of such installations.

3.4.2 Ambiguity

Several researchers in HCI have shown how ambiguity can be a valuable resource in the design of interactive products and experiences in general (Randell et al. 2004; Gaver, Beaver, and Benford 2003; Sengers and Gaver 2006; McCarthy and Wright 2004). Gaver et. al qualify that ambiguity used as a resource for design can be an important factor in the design of systems that are both engaging, thought provoking, and ultimately experiential. Ambiguous systems can allow for play and storytelling (Sengers and Gaver 2006) because they enable multiple readings of the same data; while this may not necessarily be appropriate for all interfaces, they can allow for richer interpretations.

At this point, note that there are important considerations to be made here. Not all systems can afford ambiguity. Informatics systems for command and control need to be efficient and unambiguous: These systems require that accurate and clear information be presented to the viewer when requested. Very often this information is critical to the understanding of an efficient or precise context. Multiple interpretations of such information would lead to chaos and misinformation. Wayfinding signage, street names, bus arrival notifications are intended to be efficient and tend to be unambiguous in their representation. In contrast systems that can afford a certain level of ambiguity and abstraction in the information presented to the viewers are when it is not necessarily critical to the understanding of a precise context. Artistic (poetic) renderings are allowed and sometimes even welcome. The informatics model is built over time and through multiple interpretations. For example, cartographic information, city plans, weather information are often abstract and can be ambiguous in their representations.

Designers must be cognizant of what representations are being presented to the user - in most cases; and users may have preferences that guide their choice of representations. In general however ambiguity can only be accorded to information of the latter type – where a precise or

efficient interpretation of the information is not required. When abstraction is acceptable, the representations can take on artistic and interpretive qualities. That is not to say the systems must not be designed. On the contrary abstract/ambiguous representations often contain John Maeda (2006) calls the “blur” – consciously designed soft edged representations carrying an allure of mystique that allows for abstraction and subjective interpretation. According to Maeda’s thesis, simplicity is a notion that can only be approached by understanding complexity; in order to make an artefact, simple, it must be designed within the complex contexts it will engage. For example the iPod’s innovative rotary interface seems simple not because it is simple in its construct but because it blurs all controls into an image of simplicity within the context of its use. Based on this thesis, the designer may purposefully “blur” any intentions of a potential outcome. In such ambiguous representations, such a blurring provides a rich potential of user interpretation of what is expected from them. Without dictating what an ideal experience might look like, the designer can extract many experiences from users as they engage with the design in place, several of which may be ideal in this context.

3.4.3 Ludic Engineering

In addition to ambiguity, interactive projects in recent times have also started to espouse the idea of “ludic engineering” (Rogers et al. 2002). Ludic engineering is best defined in Gaver et al.’s reading (2004) of Huizinga (1998) as the idea of people as playful creatures – with the ability to create play out of what may be clearly utilitarian activities. Thus, ludic engineering is a way to engineer play into otherwise mundane interactions and traditional interfaces.

Examples of ludic engineering can be found in work such as Randell et al.’s Ambient Horn project (2004) where nature sounds are coded through a horn like device. To listen to digital enhanced sounds in the forest, children have to place a horn like device to their ears. The horn is a simple construction that houses a standard speaker but when children use the horn to listen to sounds in a forest environment, it introduces a form of playfulness. It also transforms

the experience from one that is purely computational to one that is more experiential. In Rogers et al.'s (2002) project, children interacting with a fictitious creature known as the "snark" have to feed the snark plastic objects that resemble real food. The behaviour of the snark is eventually determined by the types of food the children feed the snark. The interaction is simple - data is encoded into the food objects that trigger certain responses from the "snark" program. However instead of asking children to input data through a keyboard and mouse, the data is "wrapped" in the food objects and "fed" to the snark creature. Both of these interactions lead to the same result but the experience afforded by the feeding interaction is significantly different from the one afforded by the keyboard interaction; it is definitely more fun to "feed" the snark than to input code into a keyboard. James and Nagasaka's paper (2010) refer to the Funky Forest, a project where elements of the interaction are built from children using their bodies to effect change in the designed ecosystem. To make trees grow in this ecosystem children have to direct a stream of water to the forest. The flowing water is projected on the ground and its direction is affected by physical objects children place in the path of the water. Once the children realize that physical objects can affect the digital stream, behavioural shifts are significant. They place pillows, cushions, and even their own bodies to direct the water towards the forest. William Gaver in his projects describes several products and installations in his papers (Gaver et al. 2004; Gaver 2006; Sengers and Gaver 2006; Gaver et al. 2006; Gaver et al. 2007; Gaver et al. 2008; Gaver et al. 2010) all which carry similar kinds of playful front end to achieve otherwise mundane results. Ludic engineering can also be observed in many commonly used commercial products. Apple iOS for example uses ludic engineering in the design of its interaction design – to delete, move, or change an application, users must change the state of the application or "excite" the icon. To do this users keep the icon pressed until it starts to jiggle. Once icons are "excited", users can move, change, or delete the application. To save the change, users must now change the

state again or “unexcite” the icon. To do this users press the Home button. Once the icons are returned to their normal state, whatever “state” they are in now is preserved in the system. The metaphor is borrowed from chemistry where atoms need to be excited to make changes and unexcited to retain changes.

One common theme in these projects is that the end user cannot immediately construct meaning from interacting with the products but meaning arises from *playing* with the interface over time. The playfulness of the interaction is the key element, one that distinguishes these projects from other interaction design projects. Ludic engineering offers a novel approach to the design of interfaces where the experience is not focused on the efficiency of completing a goal but rather on the journey itself. By introducing such a playful interaction, user experience is enhanced. What was once a mundane activity based front end is now traded for a joyful play based front end experience. Ludic engineering employs ambiguity. By introducing the idea of excitation, designers are using a “blur” condition. The user experience is not derived from the object itself, but from our subjective interaction with the interface in a situated context. Furthermore the designer has the ability to hide computational aspects of the interaction behind the playful “wrapper”. In the above examples the horn, the food, the movement of the icons all lead to data input and processing but the user is only concerned with placing the horn on the ear, or feeding the food to the snark, or exciting and unexciting the icons. This means users no longer have to comprehend or deal with the complexities of data input and processing, they only have to understand the rules of play associated with the interaction.

As interaction design folds in theories of embodiment, ludic engineering, and ambiguity into design implementations, there is a much larger social and cultural shift happening among the users of such implementations. Users are no longer happy as consumers of information, they want to play an equal role in the production of information. In urban placemaking, this triggers

two significant shifts - installations starting to respond to this change by engaging the public in the construction of the overall experience, and public starting to expect that they will have more creative input in experiences they engage with.

3.5 Emergence of the Creative Public

Candy Chang, an architect, urban planner, and designer has designed several urban installations, often combining social activism with placemaking in her projects. The installations themselves are simple, non-technological, and often just a field of tags asking just asking one question – “I wish this was...” The difference and uniqueness comes from the fact that she places these tags in provocative places such as an empty storefront in New Orleans, or a shuttered foreclosed home in Pilsen, Chicago and the end experience of the urban installation is generated not by Candy Chang but from user content aggregated over a period of time (Chang 2012). As more people on the street add their answers or commentary to this simple question, patterns emerge; as patterns emerge, responses change; as responses change, users react. In the beginning what looked like a field of empty tags is now filled with information from people on the ground. This information completes the experience that Chang helped to initiate. Interestingly, the information also serves another purpose – it is an enquiry into a community’s feeling for a particular place. Chang’s role as a designer here was not to design the complete installation but to provide the levers by which users are able to construct their own experiences over time.

Rafael Lozano-Hemmer’s projects (2012) precede Candy Chang in the use of human interaction for aggregating experiences. In many of his installations, experience is derived comes from people interacting with other people on the street using large urban surfaces and technology. In Body Movies, the installation in Rotterdam mentioned earlier, experience is derived from the interaction between users and their shadows interacting with other people and their

shadows. Once people understand that they can play with others on this flat surface, the experience changes dramatically. What started off as a viewing experience ends up as an immersive creative experience; giants stomping a dwarf shadow, boxing with each other's shadows, creating inanimate object shapes that interact with one another. The anonymity offered by the shadows help relative strangers to connect with one another on the surface in interesting ways – it is the shadows which interact, not users. This helps new narratives to emerge, maybe even ones that the designer may not have imagined.

Numerous other designers and technologists have shown the importance of engaging the creativity of the public to build user experience through the implementation of games in public spaces where users create their own experiences by playing with one another. In TwitterSpace, Ryan et al. (2008) show how an ambient informatics display can become what they call a *community-at-a-glance* interface. The basic idea employed by the researchers is to post Twitter, a virtual public broadcast mechanism on large public displays, a physical public broadcast mechanism. Their study shows how publically showing posts that are normally privately read can have an impact in communities and how it leads to increased awareness and engagement between the members of this community. The Red Nose game (O'Hara, Glancy, and Robertshaw 2008) and the Hand from Above (O'Shea 2009) show how sets of people on the street often do not know each other personally may interact to play a game together.

These projects all have a common thread – the designers themselves only create a platform, it is the creative input from the public that builds the end experience. The end experience is derived from collective co-creation of content, and the transformation of this content in near real time. While traditional urban installations such as The Picasso was designed to be complete in itself, these installations are designed to be complete only when the urban public

engages with them. The experience is richer and more complete as more and more people engage with it over time. Or in other words, these installations respond to *public creativity*. *By public creativity is meant the collective or social (group) creativity which comes from the aggregation of user generated content in public space*. Public creative installations are urban placemaking installations where “place” experience is built from the creativity of users working together to generate content in public spaces.

As new tools and technologies for social interaction start to permeate physical spatial constructs, it is clear that the expectations of the urban public have changed. But the emergence of public creativity is not an isolated event. It is related to several social and cultural trends especially around how information is consumed and produced in our society.

3.5.1 Public creativity, a result of how society consumes information

Leading up to the 20th century, information flow was controlled by those who had the ability to broadcast it. Publication houses chose the content that would populate the books they published, TV and Radio stations broadcasted shows that they decided would work, large production houses determined the type of movies that would be released into cinema halls. In all of this users on the ground for most part consumed what was broadcast to them. In the middle of the 20th century this relationship shifted considerably. Shirky and others (Shirky 2009, 2010; Anderson 2006) describe how that in the last few decades new tools of “social media” have created unprecedented opportunities to create, share, cooperate, and take collective action. With the internet, the public could also play a part in what kind of information was being published and broadcast. Moreover they could curate the content that was published for themselves as well as for others. They could also publish their own versions, maybe even create new types of information. Services emerged that responded to this demand, websites such as Digg and Reddit allowed users to curate existing content. MySpace

allowed users to compose short blurbs of information that could be broadcast to many others. Facebook, Google Plus, and Twitter allows the creation of information for specific groups. Foursquare and Google Latitude allows people to broadcast place based information, and services such as Yelp enables users to decide on where they eat based on reviews of everyday users like themselves.

It is significant to note that these services not only open up an ability for everyday users to produce information but they also shift balance of participation. Erstwhile consumers of information are now also producers of information, and traditional producers of information cannot keep up with the pace at which this information is produced. Wikipedia allows users to update encyclopedic information almost instantaneously, much faster than any published encyclopedia. Lulu and Issuu allow authors to self-publish their books on their own terms and designs, as well as distribute them to readers who they believe will benefit from the content. YouTube and VIMEO allows easy broadcast of user generated videos and films than production houses can through traditional channels.

Gee (2009) explains why this shift in balance happens:

- 1) It is easier today for everyday people not only to consume media but also to produce it themselves. The general public, not only experts, can produce content as much as they consume, using relatively simple tools and services.
- 2) Digital tools are also changing the balance of participation and spectatorship. People are no longer restricted to the role of the spectator. As participants, they can (and often do) participate in what used to be creative practices reserved for professionals. The ability to produce information and the tools to produce and access sourced information are now readily available. Information is not fixed; being aggregated and

constructed upon. So much so that it is often possible to take a single information source and watch it change over time because of content generated by users.

- 3) Digital tools are changing the nature of groups, social formations, and power. Prior to our current digital tools, it was hard to start and sustain a group. Today, with social networking sites like Twitter, Flickr, Facebook, and digital devices like mobile phones, it is easier than ever to form and join groups, even for short-term purposes. Without the requirement of formal structure, groups [or what McLuhan (McLuhan 1964/2003) would call “tribes”] can organize bottom up around specific topics or interest areas through constant communication and feedback.

Public creativity is not just a behavioural attribute of users on the internet, it is shaping the way our society consumes and produces information. Public creativity has had a major influence on urban design and will continue to influence interactive placemaking.

3.5.2 Public creativity and interactive placemaking

Public creativity has permeated every form of media. What does this mean for the user experience in public spaces? How engaged and involved will they become, moving between being observer, consumer, and creator? The new urban place cannot simply be installations that spring from an artist or designer’s intuition. Rather they must encompass the public as a creative source. New urban installations must acknowledge the shifting balance from consumption to production. When these new installations are designed and built, new lenses and metrics will be needed to understand the context, the user, and user experience. Much like the work of Lynch and Alexander served as catalysts for a methodological approach to placemaking, a similar need exists in interactive placemaking and public creativity, a need for frameworks for interactive placemaking.

A slight deviation in the conversation is required here, to explain the concept of frameworks in design.

3.6 What is a framework?

Mariam Webster's Dictionary and Thesaurus defines a framework as a basic conceptual structure (as of ideas) or a skeletal, openwork, or structural frame. It is the arrangement of parts that gives something its basic form – “you've got the framework of the story and just need to fill in the details”. At its very essence a framework is an easy to understand and transmit skeletal structure on top of which other things can be build. A framework is intended as *scaffolding* and not as a replacement for a designer's intuition or artistic conception. Like scaffolding provides the basic structure for the construction of a building, frameworks are used as structure for the construction of something new. Design framework can be either generative, evaluative, or both. Generative frameworks are conceptual structures that can be used for the design and development of new innovations – an installation, or an insight, or a new design process. Evaluative frameworks provide the metrics or lenses by which something can be evaluated – a decision for building something, user experiences in the wild, and so on.

A secondary purpose of frameworks is to communicate. Designers often use established frameworks as mnemonic devices to communicate an idea among different stakeholders through the process of design. Because of this, the basic structure of a framework should be simple and easily transmittable. Design frameworks are also intentionally designed to be expandable. While they start off with some recognizable core components, the framework provides “space” for addition and subtraction of components in each use. In an evaluative framework for example, broad categorization of what to observe could be the basis of the framework; specific criteria and lenses can be added or subtracted depending on the specific nature of the study. Once designers have access to a framework, they are able to modulate

theory or the overlapping tactics to develop new semantic appropriations. Through new interactions, old frameworks may be redefined or new frameworks may be developed. This attitude on the part of the designer is seen commonly in other design disciplines – a graphic designer, who has the knowledge of how users interpret colour and colour theory may break away from conventional rules to come up with a new graphic style. An architect, who has a basic understanding of form and pattern language, may “deconstruct” structural elements to come up with new form for a building. In this manner the purpose of a framework is not to prescribe a certain form or function but to describe a direction that a design can take.

Within HCI and design research, several researchers have attempted to construct methods or tools by looking at immediate interaction within interactive installations. Very often these are observations and studies conducted by researchers themselves or are developed to study engagement with other people’s interactive installations. While these researchers did not intend these observations to be seen as comprehensive lenses or metrics, they must be seen as precursors that will help evaluate rich interactions and engagements that emerge at urban installation. The following sections will look at observations, and insights derived from other researchers’ projects that will become components of a framework for evaluating user experience in public spaces.

3.7 Developing a Framework for Interactive Placemaking

In this section we will evaluate operational information from recent work in HCI and Design, as well as based on computationally enabled public interaction. Unlike the previous sections which looked at a broad range of philosophical literature, the following sections feature more practical insights from previously installed experiments and projects. This is an intentional shift in the literature review section. The intention of citing this work is to highlight key components that could aid in the construction of a framework for interactive placemaking. In the following

chapter, the following insights from other researchers will be stitched together into one connected framework.

3.7.1 Initial Perception of the Installation

One of the first insights in this section is the nature of the installation as perceived by users in public spaces. This insight comes from the early work of Cornock and Edmonds (1979) where the authors describe the various ways in which interfaces (especially art installations) can be perceived by users:

- 1) *Static*: The installation does not change. It is perceived (almost always) in this static state by the viewer. There is no interaction between the art and the person viewing it. In most such cases (as is common in museums and galleries), the art may be augmented by additional information about the artist or the history and/or influence of the art. These augmentations may be in the form of tags, audio/video recordings, interactive, or printed material. These augmentations may add additional interactive information to the viewing of the art, but does not change the static nature of the piece itself.
- 2) *Dynamic-passive*: The installation has internal programming that allows it to change or be modified. This change may be through a randomizing algorithm or in response to changes in its environment – temperature, light, wind, or other physical forces. While the art itself is dynamic, the viewer continues to be a passive observer and cannot impact the change or the modification of the art piece.
- 3) *Dynamic-interactive*: In this context, the human actor plays an active role in the modification of the installation or the environment it is set in. Most “interactive” installations fall into this category where installation is transformed or effected by the

actions of the user or the subject, or in other words, the installation “performs” based on the manipulations of the actor.

- 4) *Dynamic-interactive (varying)*: In the previous category, the reaction of the installation may be complex, but they are predictive and controllable. In dynamic-interactive (varying) systems, the installation ‘grows’ based on the manipulations of the actors on the installation or the environment. The interactions may be recorded and used by the installation to adapt its reaction process. Or the reactions may be based on criteria such as history of interaction, the personas of the human actors, or transformation in the context/environment. A varying system may also be as simple as the creator (artist) transforming the interaction model from time to time. But to the perceiver of the installation, there is complexity in the interaction – one that is unpredictable and “seemingly” uncontrollable.

In previous sections, it has been shown how the perception of an embodied experience is dependent as much on memories of previous experiences as it is on the immediate interaction. Cornock and Edmonds’ categorization offers a way for designers to structure this experience. If users are able to quickly perceive the type of installation that they encounter, it becomes easier for them to build an understanding of what is expected from them and how the experience might unfold. However such comprehension by itself does not guarantee interaction. As shown by various researchers, whether users move into interact is dependent on another key aspect of perception – evaluation apprehension.

3.7.2 Evaluation Apprehension

In an public installation called the Opinionizer, Brignull and Rogers (2003) noticed an interesting behaviour among the people that played with their installation. The Opinionizer was designed as a public creative installation, a shared display where people could add their

views and opinions to, which they and others could observe and then add further comments to if they felt inclined. Here is what they observed:

At the beginning of the party, the first people to arrive tended to congregate near the buffet table, a few meters from the Opinionizer screen (in the center of the room). At this point, few people came forward to try out the Opinionizer, and when we tried to invite some of them over, they were rather wary of doing so, concerned that it might involve too much time or effort, or that it would involve looking stupid in public. Hence, we came up against the barrier of social embarrassment...One person commented, later "Nobody really knew what it was when they came in and there was a whole kind of fear because it was something new"...one participant said, "...there was pressure to formulate something not too dumb". ... As one participant noted: "I was definitely aware of other people watching, which made it kind of awkward." (p.3, 5)

They propose the term *social embarrassment* to describe this behaviour. They define it as the fear experienced by users when they encounter a public installation of their behaviour being judged by social others in the vicinity witnessing the behaviour. No one wanted to be the first person to start, in the fear that they would be subject to an embarrassing experience, or worse yet be the only lone person interacting. Brignull and Rogers suggest that within public interaction, social embarrassment can be a key factor in determining whether people will interact with a public display in front of an audience.

Similar observations were made in the RedNose game described by O'Hara et al. (O'Hara, Glancy, and Robertshaw 2008). These researchers found that most people who interact (or want to interact) with the public installations feel an evaluation apprehension. In addition, if the manipulations required are very big and physical, one's exploratory mistakes are highly visible and amplified to the larger public.

In Bradford, for example...getting participation started proved to be a difficult task. No one wanted to be the first person to start the game and be the lone participant playing the game. In

part this can be attributed to a lack of understanding of the game. But active exploration of a game in a public setting through trial and error (in a way one might do with screen based games at home) can be socially awkward. In addition within a public space, large parts of the audience are unknown to potential participants. This created a reluctance to initiate game play.
(p.71).

Hornecker (2008) who experimented with tabletop displays in public museum settings claims that in order to counter evaluation apprehension, public installations need to have immediate apprehendability. By this she means that if an exhibit has a boring, effortful or confusing component, visitors will have an uncertainty about the reward for persisting, and are likely to move on. Visitors need to understand and feel the effects of the installation early on. They must also feel competent, and understand the purpose, scope and properties of the installation almost immediately for successful interaction. Another key attribute that might alleviate evaluation apprehension is the context in which a public installation is placed and the activity zones that it projects around itself. Not all installations inherently demand the same level of interaction and this is connected to a characteristic of the installation known as thresholds of activity.

3.7.3 Thresholds of Activity

In the City Wall project, Peltonen et al. (2008) installed a large multi-touch display in a central location in Helsinki, Finland; users on the street were able to interact with a multitude of images gathered from Flickr and manipulate these images in real time. Since the display was multi-touch enabled many users could interact at the display at the same time. An important observation made by the researchers during the course of the research was that the presence of other users is important to the way new users arrive and engage with a public display. In 19% of the cases, CityWall was already in use by someone else when a new user entered the display and started using it.

...[in an example] *people are gathering under the sunshade to shelter from the rain that has just started. Despite the fact that objects on the screen are constantly moving, they are not paying attention to the screen, and stand with their back towards it just waiting for the rain to end. After ~20 seconds, a boy arrives there with his friends, notices the instructions next to the screen, and touches the screen, which, to his surprise, reacts. He utters "ooh", getting the attention of his friends and the older man standing next to him* (p. 1289)

O'Hara et al. (2008) note that such behaviour is often influenced by the positioning of the installation, which defines the potential audience who may come to see or interact with the screen. In the Red Nose Game project, they were able to identify different zones of interaction where audience members passively viewing to active engaging with the installation. Brignull and Rogers (2003) found similar activity zones in their own research and refer to them as thresholds of interaction or activity. They identified three such thresholds:

- 1) *Peripheral awareness threshold*: People will almost always judge the interaction from a broad perspective before moving closer and closer to actively participating. In effect, this is like looking at an image from far away and realizing, as you come closer, the finer attributes of the pixels that compose the image. People in these zones are engaged in activities such as eating, drinking and socializing outside the context of the installation. In general, people in these activity spaces are peripherally aware of the display's presence but do not know much about it.
- 2) *Focal awareness threshold*: People in these activity zones are engaging in socializing activities associated with the display - talking about, gesturing to and watching the installation being used. It is in this zone that the Honey Pot Effect is likely to manifest (see below). At this point, users may give the installation more attention and try to learn more about it.

- 3) *Direct interaction threshold*: In this activity space, an individual (or a group acting cooperatively) act upon the installation or may have indirect influence in another performer or user's interactions with the installation.

This idea of thresholds provides an important characteristic for design of space around an urban installation. The interaction models afforded by the different spaces will also determine subsequent behaviours associated observed within this space. Furthermore, interpersonal distances, used by people to process and negotiate interactions with other people, come into play when they interact with urban installations also. This concept is explored in depth in Hall's definition of Proxemics and Greenberg et al.'s subsequent development of Proxemic Interactions.

3.7.4 Proxemics and Proxemic Interactions

In 1966, anthropologist Edward Hall proposed the idea of Proxemics, an important aspect of how people understand space (Hall 1966). Proxemics is essentially concerned with the culturally dependent ways in which people use interpersonal distance to understand and mediate their interactions with other people. In his book, Hall defines four main spaces which people organise and construct around themselves. People allow other people to enter these spaces based on familiarity and type of interaction. In order of increasing access to public interaction, these spaces are – *Intimate Space, Personal Space, Social Space, and Public Space*. In his work, Hall defines very definite distances at which people establish these spaces and called them *reaction bubbles*. While the distances are not critical to this thesis, it is important to note that the distances exist and people construct these spaces. The effect of this construction can be seen in how people when they appropriate public space interact with each other; for example two or three people might club together and form a circle to talk in a public pathway. This social action not only creates a social space for the three people in conversation

but also signals to other people using the pathway that they have done so. In this manner, the idea of proxemics plays a very important role in the design of everyday public space. With the advent of computation, HCI researchers have proposed that the idea of proxemics might also play a role in how users interact with computers in public spaces. Greenberg et al. (2011) developed the concept of Proxemic Interactions based on Hall's work. As computers and interactive systems become increasingly sentient, the authors argue that proxemics becomes an important tool for interaction design, and offer several dimensions by which designers can adapt the concept of proxemics to the design of interaction:

- 1) *Distance*: The continuous measure of distance as perceived by the user (or the medium) or a binary measure – whether an entity is in the same room (or space) as another entity.
- 2) *Orientation*: How the medium is oriented to the user, or how the user is oriented in relation to other users;
- 3) *Movement*: The distance and orientation of a user over time;
- 4) *Identity*: who is using the installation;
- 5) and *Location*: where the two (user and medium) are located also affect the interaction models of ubiquitous system.

Vogel and Balakrishnan (2004), offer a slightly different model of interpersonal distance. They note that complexity of interaction increases when users cross from one threshold to another. With their discrete model for distance, they also provide the key values of how a user might move and orient himself/herself as s/he moves through the interaction process:

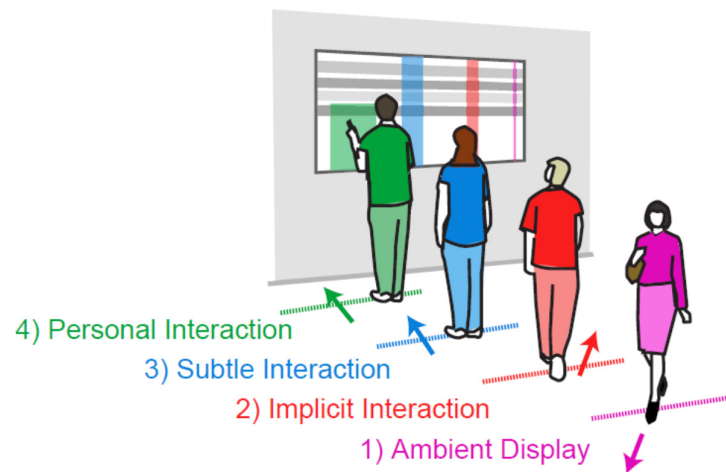


Figure 3.4 Vogel and Balakrishnan's mapping of interaction zones.

They are able to provide a similar framework to Thresholds of Activity by mapping the interaction space into four distinct distance and orientation zones:

- 1) *Ambient*: where the installation is seen but not interacted upon;
- 2) *Implicit*: where the user moves from peripheral awareness to focal awareness and displays an implicit intent for interaction;
- 3) *Subtle*: where the user interacts with the installation but only to evaluate and understand what is happening;
- 4) and *Personal*: where the user engages with the installation in a deep and meaningful manner.

Both of these frameworks help designers understand how best to situate displays and devices in public settings. However the focus of these frameworks are from what can be designed into the installations themselves. The following studies take a slightly different position – shifting from point of view of the installation to point of view of the user. Behaviours and phenomena

such as the Honey Pot Effect, Manipulations and Effects, and Strategies of Use describe how users react when they engage with public installations.

3.7.5 The Honey Pot effect

The Honey Pot effect is the progressive increase in the number of people in the immediate vicinity of the installation, as performers or other users start to interact with the installation. Observed and recorded by Brignull and Rogers in their Opinionizer study (2003), the Honey Pot effect is the result of social affordances as people will congregate on the periphery of the interaction without actually interacting with the system simply to ascertain what is going on and what is expected of them. Even though people are not interacting, this is a very important social attribute for the eventual interaction.

For example, one participant said: "I didn't see people using it at first, but I did see people standing around it so I stood beside and watched it for a while" (p.6).

The Honey Pot effect creates a sociable 'buzz' around the installation that allows people to evaluate the system or at least show that they are interested. People standing in this space are often potential users looking for cues as to what the installation does and evaluating the manipulations of current users and effects of the installation.

The Honey Pot effect is a behaviour displayed by spectators of an interactive installation. As interactive placemaking uses public creativity as a key attribute, the role of the spectator, the role of the participant, as well as the transition between these roles become key elements in the design of such interaction. Designing the spectator experience becomes as critical to the success of the installation as designing the core participant experience.

3.7.6 Spectator Experience

A taxonomy of interaction presented by Reeves et al. (2005) suggest that public installations must pay equal attention to the spectator as they must to the user. They claim that as interactive technologies are designed into environments such as museums, libraries, schools, clubs, interaction becomes a public affair that needs to be studied in the context of public use. And much of the interaction at such installation is a “performance” for spectators. From their studies, they deconstruct interaction into two core attributes:

- 1) *Manipulations*: Manipulations are the actions carried out by the primary user of the interface or in their words, the ‘performer.’ Manipulations are often physical actions of the performer that lead to a transformation in the interactive installation. These may be through change of physical controls (buttons, mice, joysticks and so forth) or gestures, movements and speech that are sensed by the interface. Manipulations can be more than simply system input, as they may be actions that are outside the installation’s sensor scope; i.e., gestures, movements, and utterances that take place around the interface but that do not directly result in input to it.
- 2) *Effects*: While manipulations are a property of the performer or the user, effects are a property of the installation. It is the interactive nature of the installation that leads to effects. Depending on the installation, effects may take the form of images, graphics and sounds or the physical actuation leading to transformations of the physical attributes of the installation and/or objects in its environment, and/or the environment itself. Effects include what we identify as the main ‘content’ of the interaction, but may also include other visible effects of the performer’s manipulations of the system, such as the appearance of menus, icons, cursors and so forth that are a necessary part of manipulating the contents.

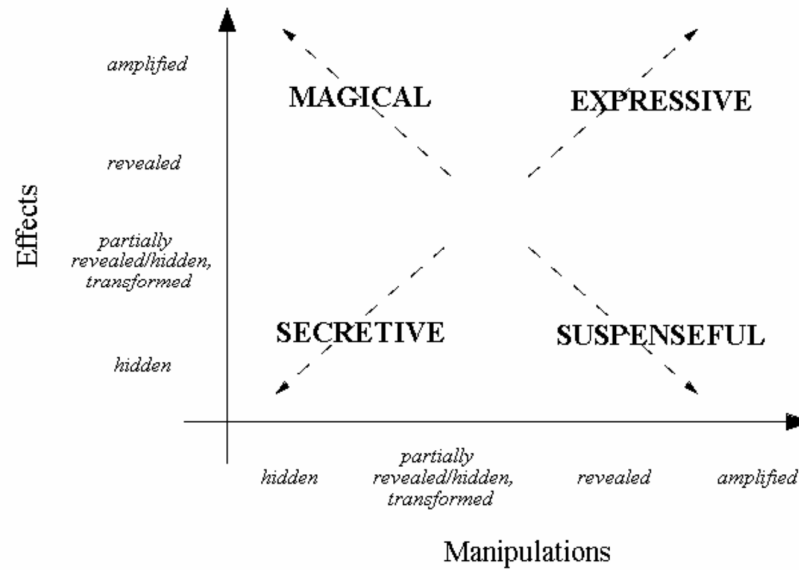


Figure 3.5 Reeves et al.'s model for organizing interactive environments in public spaces.

Building on this work, Reeves et al present a model for organizing interactive environments based on the intentional display or hiding of manipulations and effects:

- 1) *Secretive interfaces* hide both manipulations and effects. The intention may be to protect spectators from knowing about the experience until it is their turn, or to protect performers from interference.
- 2) *Expressive interfaces* reveal, sometimes even amplify, both manipulations and effects. For installations, expressive interfaces are concerned with attracting spectators and then enabling them to learn by watching so that they can prepare themselves for their own turn with the interface.
- 3) *Magical interfaces* reveal effects while hiding the manipulations that led to them. A 'Wizard of Oz' interface can be envisaged as an extreme form of magical interface in which even the magician is hidden.

4) *Suspenseful interfaces* reveal the manipulations while hiding the effects of these manipulations. As with expressive interfaces, spectators may be attracted by seeing the interaction and may be able to learn something of what to do by observing, but in this case will not experience the effects until it is their turn. Watching others manipulate and react to the interface without seeing the content may serve to provoke curiosity and increase anticipation, heightening the 'payoff' delivered when it is finally their turn.

Reeves et al.'s four types of interfaces allow designers to come with many possible design directions. This is interesting from two points of view: first, it provides a direct framework for designers to use; second, it shows that two simple points, manipulations and effects can lead to a broad spectrum of potential designs for urban installations that encompass public creativity. People however do not interact with installations on their own; in fact many times they may come across the installation as a group and may choose to interact as a group. In many such use cases, as seen in multiple studies, users often develop different strategies of use.

3.7.7 Strategies of Use

Manipulations and effects are characteristic of the user's interaction with the installation. When larger groups of people interact with a public installation they develop strategies of use based on the social context they find themselves in. Such strategies are not so much a reaction to the installation but rather a reaction to those that around them when they chose to interaction. Strategies of uses are developed irrespective of the relationship of one user to another. This is important because interaction at installation is an embodied act, complete with all the characteristics of social use. This means that we bring to the interaction, all of our expectations and biases from every interaction we have had with interactive devices as well as

public structures. And we are quick to develop personal relationships with others in the same space and context as has been shown by Peltonen et. al (2008):

... [in this example] each of a pair of young males has picked his own photo, rotating and scaling it irrespective of what the other is doing. In this respect, their use also can be characterized as parallel. However, at some point, the two friends notice a similarity between their interactions, and start making fun of it. They start scaling up and scaling down the photos in a synchronized and pulsating fashion. This turns into a kind of dance, as the person on the left starts bending his knees and nodding his head according to the rhythm of the photos (p.1289).

Peltonen et al. also describe the development of personas – characteristic role playing adopted by users at the time of interaction. They observed that users adopt different roles and take turns at playing one or even all of these roles—depending on circumstances. Roles that they observed included that of a teacher–apprentice where one or more users took the role of an experienced or technologically savvy user, and went on to explain the features of the application, assisting the other members of the group when needed; or a comedian; or other such.

... [in this example] the man shows and tells his girlfriend how the touchscreen works. The posture of his girlfriend clearly tells she does not intend to touch the screen yet.... [in another example] the man in front of the display gives an overview of various parts of the UI. For that purpose, he has positioned himself between the screen and audience. In the user interviews, it also came up that it was easy to learn to use the touchscreen just by following the example of others, and nobody actually needed to read the instructions printed next to the installation. (p. 1292)

Another strategy of use is defined by O’Hara et al. (O’Hara, Glancy, and Robertshaw 2008) in their observation of users in the RedNose game. They claim that in public installations, groups

of users may adopt summative strategies to overcome certain socio-cultural barriers posed by the installation and its environment. These strategies of use can be:

- 1) *Parallel*: players work in parallel but on different activities.
- 2) *Sub groups*: users work together
- 3) *Co-ordinated*: Collaboration usually in the form of a leader shouting instructions.
- 4) *Highly Co-ordinated*: Collaboration strategies where a whole group of people link together to interact with the system.

These observations show how users begin to interact with the installation or interface, what techniques and methodologies they use, and how they develop embodied relationships with other participants around them. For most urban installations, the ultimate aim of interaction tends to extended engagement, where the user can enter into a continuous dialogue with other users within the context of the installation. User dialogue is a key element of user engagement, particularly because it signifies the move from immediate engagement at the installation to extended engagement that goes beyond that located, immediate interaction.

3.7.8 User Dialogue

Bilda et al. (2008) present a framework constructed from observations in interactive art installations that help designers to build extended engagement that goes beyond the immediate interaction with a public installation. The framework describes three elements which shape a user's passage into extended engagement.

- 1) *User intent*: A user of an interactive installation will have intent in using the system. This intention (in performing an action) can be identified from the participant's specific purpose (fun, pleasure, curiosity, accomplishment etc.) in performing the action. The

intent of use comes from the user's prior knowledge of other such interactions. The user anticipates a certain reaction because of such knowledge. However in systems with emergent goals, such anticipations may not be fulfilled. At this time, the user/participant learns new reactions that the system may be capable of. As the user picks up more such learning, s/he begins to interact differently with the system.

- 2) *User expectation*: In addition to the intent with which users approach interactive systems, they also expect an outcome or goal from the interaction. User intent is related to the experience of the user, his/her construction of all prior experiences. It is derived from an interaction perspective. User expectation is related to the participant's expectations from computing systems and his/her knowledge of computing systems. It is derived from an interface perspective. As the user learns new things about the installation or the interaction, s/he begins to adapt to the learning. At this point, expectations may change and/or evolve.
- 3) *User dialogue (engagement)*: In most interactions with computation, users are able to determine if their manipulations with the system has had the necessary effect if the expected result is achieved: for example, clicking on the "play" button plays a video. However, in ambiguous and abstract systems such as the interactive art, this may not be an appropriate judge of whether an action is successful. The core factor which determines creative engagement is the interactive installation's ability to act as a lever for unintended results.

Examples of user dialogue from Bilda et al.'s research (2008):

"I kept trying to get little recognisable parts of my body onto the screen. That was quite cool. I was quite intrigued by that...at this point I was thinking like - because I do a lot of choreography and I was thinking oh this is a really interesting choreograph." (p.537).

“I tried to figure out, because I’m a musician, I tried to work out the rhythms in my head and work out if I could layer them or how they related to each other, so if I could get a steady rhythm going in one place, how this affected or how the tempos or moving to another place were related.” (p.538).

It is when such unexpected results happen, that the user begins to have a dialogue with the system and develops a deeper understanding of his/her relationship with the system. This dialogue may not be an explicit two way conversation; instead it can be a transformation in the intentions and expectations of the user brought about by the system. When this happens, the user continues to remain engaged, much after the immediate engagement at the public installation is complete.

As can be seen, there is already much written about user interaction in public space, building on the concepts of place, space, context that can be taken from both philosophical literature as well as observations of real installations. This thesis aims to meld these into a comprehensive framework through a process of iteration, dovetailing and refinement. Many of the observations are disparate, often done by different researchers in different projects, and in different contexts. What is needed is a structure – a skeletal system along which the disparate observations can be combined and assembled. How might one achieve such structure? How can these disparate observation be combined into a comprehensive framework?

3.8 Building a structure for existing insights

While the literature review chapter is designed to be extensive, it is by no means comprehensive; several important projects in public spaces have been left out of the review. The chapter covers only a few examples of contemporary research in areas such as interaction design in museums, tabletop interactions, displays in cafes and other public locations, location based experiences, and situated signage (such as the work of Hornecker, Benford, Goulthorpe,

O'Hara etc.). Since the focus of the thesis has been on placemaking and interaction design in urban locations, these references were not seen as a critical part of the core discussion. However, it must be noted that insights from many of these studies are used as part of the discussion around frameworks, and operational theory. Other research especially in architectural theory (such as the work of Alberto Perez-Gomes, or Steven Holl) or communication theory (such as the work of Lev Manovich, or Henry Jenkins) while important to the discourse were intentionally not included in an attempt to constrain the scope of the review. The literature covered in the thesis is constrained to two levels – a philosophical level around embodiment, ludic engagement, and place theory, and a practical level where discrete and disparate observations derived from specific research in the wild are presented. These observations are often operational in nature. Whereas the initial sections of this chapter present a philosophical stance, later sections present a more operational stance.

Both of levels – philosophical and operational, are important for design because the process of design is incomplete without either. Take for example, a graphic designer. He or she may know that users perceive colours in a particular manner, understanding that the semantic connections associated with the colour red is different from those associated with green. While this knowledge may not be easily operationalised, it does influence the choices the designer makes when using the colours red and green. In addition, the designer may use frameworks such as the colour theory, understanding that red and green are complimentary colours and positioning them in a graphic layout will have a specific effect. This is tactical knowledge which can be easily operationalised. It could lead to the way he or she positions colours in a particular page. In this example, the graphic designer is using theoretical concepts to derive meaning and the frameworks to build structure. A combination of the theoretical references and operational frameworks enables a designer in the process of design.

The primary purpose of this literature review is to develop a preliminary understanding of relevant frameworks, theories and empirical studies. Many of the components were derived from specific insights in lab or in-the-wild studies, and in the following chapters, these insights will be compiled together as components of a framework. The framework based on these disparate insights will inform the design and evaluation of creative engagement in interactive public installations. These installations are designed as prototypes to understand the validity of the components and the framework as a whole. In the first iteration of the framework a simple structure is adopted - three phases of the interaction process, phases through which users' moves as they come in contact with an interactive installation. This is based on a layering of the observations derived from the work of Brignull and Rogers, Reeves et al., O'Hara et al., Peltonen et al., Cornock and Edmonds, and Bilda and Edmonds. The simple structure is composed of perception, interaction, and engagement, a time based axis along which the observations are organised. This initial mapping of behaviours is explained in detail in the following chapter. The structure is designed to take the specific behaviours and map them along a trajectory which can then be used by designers for both generation and evaluation of interactive installations. As will be seen in the following and subsequent chapters, this framework is compiled, tested and refined against several different studies of existing public installations, and prototypes of new installations. The purpose of these studies is to put the framework to test in the wild, to evaluate first if the categorization works, second if the framework can be used for evaluation and generation of installations, and third to use the framework as a starting point for new questions and insights. The intention is to evolve and expand the framework with each study as well as identify new questions and insights that come from these studies.

Chapter 4. Case Studies

As described in the literature review, the purpose of studying the work of other researchers is primarily to build a framework for interactive placemaking. As described in previous chapter the idea was not to build the perfect framework from the get-go but to start with a framework and use the *research through design* process to evolve it. The vast body of information that can be derived from both the philosophical literature as well as observations of real installations described in the previous chapter becomes the basis of this initial framework. However the observations are disparate, often done by different researchers in different projects, and most importantly in different contexts. In the basic framework a simple and obvious structure was adopted - three phases of the interaction process, phases through which users' moves as they come in contact with an interactive installation.

The first phase is perception, when the user first comes in contact with the installation/interface. In most cases, this is when the user first sees the installation or sees other people engaging with the installation. At this time, the user creates his/her initial understanding about both the installation and the social ecology that surrounds the installation. In this phase, there is the intention of interaction but no actual interaction.

The second phase is interaction, which starts when the user moves in to interact with the installation. The user may start off as a spectator and then move into direct interaction with the installation. Most user experience studies are conducted at this phase, mostly because it is the phase where evaluations can be made about the user experience and the effectiveness of the installation.

The final phase is engagement, where users become creatively engaged with the installation. In this phase, creative engagement affects a change in the behaviour of the user or a change in

the interaction model of the system. The interesting thing about the engagement phase is that its occurrence may happen at the installation or may extend beyond the immediate engagement through other devices and platforms.

4.1 The PIE framework

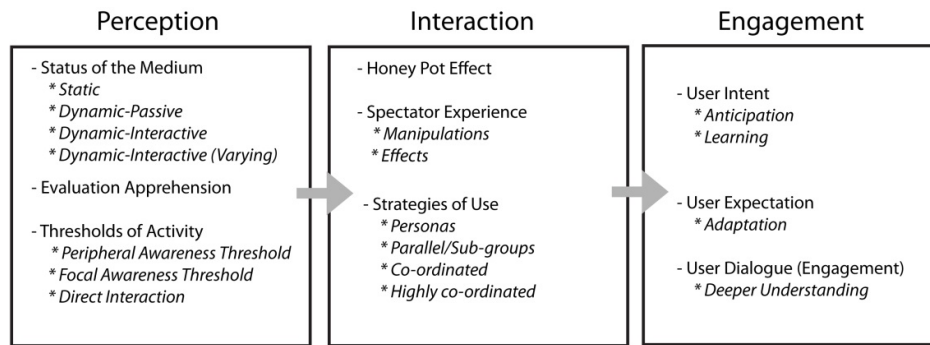


Figure 4.1 The first basic framework developed for interactive placemaking, henceforth referred to as the PIE framework.

A simple categorization of this trajectory led to the development of the first framework used in this thesis. The framework is called the Perception-Interaction-Engagement framework, henceforth referred to as the PIE framework. Under each category of the PIE framework are behaviours exhibited by users. These behaviours derived from literature review, as seen in the last chapter, help expand the research questions by posing sub-questions that can be answered through a series of studies.

Any user entering into interaction with a public installation starts in the Perception phase. This Perception phase contains three behaviours: *status of the medium* which refers to how users see the installation in front of them, posing the questions:

- 1) Are users able to see if an installation is a static installation, or a dynamic installation?
- 2) If perceivable, are user able to differentiate between passive, interactive, and interactive (varying) installations?

Once the users understand what type of installation they are dealing with, the next behaviour they exhibit is *evaluation apprehension*, a fear to interact with the installation owing to the fact that they could be socially embarrassed by their actions or the effects of their actions.

- 3) What can designers do that will help users move into interact with the installation?
- 4) How can the installation itself, or the space around the installation, or information associated with the installation provide immediate apprehensibility and help users get over evaluation apprehension?

When users decide to move in to interact, *thresholds of activity* come into play. These are behavioural thresholds established by users around the installation that progressively help them to move into interacting with an installation. Most users are in passive awareness when they first come in contact with an urban installation, first threshold they cross into is one of focal awareness; following focal awareness, users move into the next threshold which is of direct interaction.

- 5) Are such thresholds of activity established at all public installations?
- 6) If yes, what behaviour do users exhibit when they are in one of these thresholds and when they begin the transition to the next threshold?
- 7) What can the designer do to make the transition from one threshold to another easier and quicker?

Once users shift into the direct interaction threshold, they move from Perception mode to Interaction mode. Under the category of Interaction are three behaviours. The first is the *Honey Pot effect* which describes the progressive increase in people getting together around the installation to evaluate the installation and what is demanded of them. Honey Pots may be formed around the installation.

- 8) Do Honey Pots form all the time?
- 9) Are there different types of Honey Pots?
- 10) What can designers do in the design of their installation or the space around the installation to help Honey Pots form?

At this stage users are trying to build on or break down their expectations of the installation from any previous experience they have. People in the Honey Pot are evaluating other users' *manipulations*. These are users who are interacting directly with the installation and the results of these interactions is visible in terms of *effects*. Effects are reactions of the installation to the users' manipulations, as well as the reaction of the users to the results of their own manipulations.

- 11) What relationships do manipulations and effects have to the user's trajectory?
- 12) What different types of manipulations and effects can be observed?

Users, both in the Honey Pot as well as in direct interaction, may at this point come up with different *Strategies of Use*. These are behavioural or active tactics that users may employ to interact with the installation. Some strategies of use derived from work done by previous researchers include *personas*, where users adopt different roles as they interact with the installation; *parallel/sub-group interaction*, where two or more individual group up to interact; *co-ordinated and highly co-ordinated interactions*, where users may develop tactics together but interact separately with the installations.

- 13) What strategies of use do users engage in?
- 14) What are the mechanics of these strategies?

Users who continue in the interaction trajectory now enter an Engagement Phase. Under the third category Engagement are three behaviours, *User intent*, *User expectation*, and *User dialogue*. Unlike the other behaviours in previous categories, these three are linked to one another and are dependent on one another for engagement. User intent is the intention of the user when they step into an interaction, what are they there for. User expectation is how they expect the interaction to unfold based on biases, previous interactions, and memories of other experiences. And finally User dialogue is long term engagement with the installation based on how well the first two behaviours played out.

15) What is engagement? How do users engage with public installations?

4.1.1 Evaluating validity of the PIE framework, evolving it

The PIE framework is simply an ordering of the different observations collated through the literature review. The directional hierarchy of the framework - Perception occurs first, followed by Interaction, and ending with Engagement ensures that the component observations become useful generative and evaluative tools. As will be seen in the following chapters, this hierarchy Perception-Interaction-Engagement will evolve based on the different studies in this research. Behaviours and observations from other researchers, described in the previous chapter were carefully categorised and positioned within the specified hierarchy (see Figure 4.1). Only a certain set of behaviours were chosen for the framework, some were eliminated either on the basis of redundancy (they are similar to other behaviours that appear), or on the basis of generalizability (can they be used for generation and evaluation of public installations?). Take for example the frameworks proposed by Greenberg et al, and Vogel and Balakrishnan on *Proxemic Interaction* are not part of the PIE framework; while these behaviours are important for the design of public installations as described in the previous chapter, the similarity of these behaviours to *Thresholds of Activity* meant that only one was

adopted for the initial PIE framework. Of course, the list may need to be changed and edited based on the studies which follow, but this at least gives a starting point to work from.

The decision of where a behaviour appears within the framework is determined by where in the trajectory of a person's interaction it might be observed. This information comes either from a review of research already completed (see Chapter 3: Literature Review) and/or conjectures about where it might occur based on the PIE trajectory. It must be noted that the framework at this point is only a listing, the actual first test of these conjectures will be done through the case studies described in this chapter. The following chapters will illustrate how the PIE framework and its subsequent evolutions were used as input for the studies done as part of the thesis. Each chapter contains information that is specific to the study – motivations for doing the study, observations from the study, insights important to the thesis, and how each study informed the next. In addition, each study will help to understand the nature of public spaces and user behaviour in such spaces. In doing so, the studies are also used as vehicles to test the validity of the framework in the wild and help the framework evolve.

4.2 Two Case Studies

The first study of the research involved in-the-wild observations at two urban art installations located in Chicago. Urban art is an important feature of Chicago's urban experience. During the 70's and 80's and through to today, many large scale art installations were constructed, installed in an attempt to change the run down quality of the city to a more engaged participatory one. Among the most recent projects, two installations stand out as particularly prominent because of its location – in Millennium Park, and proximity to the main tourist street – Michigan Avenue as well as Michigan Lake. Anish Kapoor's Cloudgate and Jaume Plensa's Crown Fountain are considered to be a significant part of the Chicago experience. They voice the contemporary position of their artists as well as the modern outlook of

Millennium Park, a new open engagement space designed by Chicago for the new millennium. They are both designed to be big artistic statements, yet the experience is derived through a corporeal engagement with the piece. (Artner 2004).

These urban art installation became the focus of the first set of case studies employed to test the framework. Of significance here is that both of these installations were already in place when the study was initiated. Users were familiar with the installations, the surroundings, as well as context. No additional prototypes, environments, or interactions were designed for this study. The study mostly consisted of direct observations using a fly on the wall technique at the two sites. Both the studies were done over several hours, morning to evening, and over several days of the week. Several notes were written, photographs taken, and sketches were made based on what was observed on the field. From these observations, insights were derived that were then analysed and led to an evolution of the original PIE framework.

In the following sections, the two studies are described in detail showing how the framework was used to evaluate a public installation that was already in place.

4.3 Case Study 1: Cloudgate

Cloud Gate is an urban art installation in Chicago's Millennium Park, designed by British artist Anish Kapoor. Unveiled in 2004, the sculpture is a "bean" shaped structure of polished reflective steel. Its exterior consists of 168 highly polished stainless steel plates. It is 33 feet by 66 feet by 42 feet and is placed within the context of the city. The sculpture's exterior reflects and transforms the city's skyline. Visitors are able to walk around and under Cloud Gate's arch, which is 12 feet (3.7 m) high. On the underside of the sculpture is the omphalos, a concave chamber that warps and multiplies reflections.

Like the other sculptures in Millennium Park, Cloud Gate is set within the larger context of the city. This is important because the city forms the canvas for the engagement potential that Cloud Gate offers. The highly polished stainless steel surface of Cloud Gate is reflective. Because of this the skyline of the city is reflected off the surface, but in a convoluted manner following the folds and curves of the "bean" structure. By standing in front of the structure, it is possible to position oneself as part of this large convoluted fabric of the city. In addition, as you move beside the structure your reflection changes based on the curves and folds of the structure; sometimes even multiple reflections might occur. All of this allows for a very engaging interaction with the sculpture as well as other spectators within the environment.

Interaction with Cloud Gate is quite open and arbitrary. There is no one prescribed trajectory as to how the sculpture should be used. Part of this stems from the artists intentions while designing the installation-

"a certain kind of disorientation that I hope reorients...trying to hold things to a certain stillness...so that somehow one is forced to slow down enough, to look, to measure with perhaps a little uncertainty in the eye, so that you have to put your hand out to affirm that what you are looking at is really there" (Kapoor 2008).



Figure 4.2 Cloud Gate as positioned in the middle of Millennium Park, overlooking Michigan Avenue. The massive steel sculpture reflects the city and provides a backdrop for users to engage with.

Cloud Gate was chosen for the initial study because of its potential to encourage and enable engagement despite its lack of intentionally dynamic elements. This study was essentially viewed as a “control study” – it does not have any interactive computing built into it and its context in terms of location and use is the same as Crown Fountain. What it provides is an initial ‘test bed’ to evaluate the elements of the framework, in particular, the extent to which perception, interaction and engagement take place, across different user groups.

4.3.1 Observations at Cloudgate

Cloudgate is a *static system* as per the framework defined by Cornock and Edmonds (1979). An initial observation at Cloud Gate was that strong *Thresholds of Activity* are set up by users around the sculpture. By this is meant that people who engage with Cloud Gate transition through several thresholds before moving into active engagement with the sculpture. Cloud

Gate is located in a park like setting, which means the sculpture does not demand interaction. Therefore the outer zone around the sculpture is composed of transient visitors – people who have *peripheral awareness* of the sculpture. These people are often passersby who may not have intentions in interacting with the sculpture. As they come closer, they begin to see other people interacting with the sculpture, and this perks their interest. Some of the transient visitors then move into the next zone of interaction, where they come into *focal awareness*. At this point, they congregate around the sculpture, talking about it, taking photographs, gesturing at other people who are interacting with the sculpture signifying the beginning of a *Honey Pot effect*. Spectators in the focal awareness zone almost always remain passive observers, and never directly interact with the sculpture.

Most of the visitors in focal awareness eventually move into the direct interaction zone. In most cases, this is triggered by a quest to find their reflection amongst the many reflections on the sculpture. Sometimes, this may be hampered by an *evaluation apprehension*, often in older visitors. However, this was only noticed in a few people because at any given time, there are a large number of people interacting with the 'bean'.



Figure 4.3 Users engaged at various levels around the installation – gesturing as a way of pointing out reflections, taking photographs, viewing themselves as part of the contorted city reflection.

A key observation is that very few people move from peripheral awareness to focal awareness; however the transition from focal awareness to direct interaction and finally to core interaction in the center of the sculpture is more likely if users make the first jump into focal awareness. The transition from focal awareness to direct interaction is more likely among small groups of people rather than individuals or couples. Often groups that include children and/or teenagers are more likely to make the jump.

The installation, by its very nature, does not demand interaction. *Honey Pot effect* was a major factor that influenced people to move into interact with the installation; behaviours such as touching the 'bean', looking at their reflection from many angles, lying under the 'bean', to contorting their bodies to see how their reflections changed were all observed. But users started by looking at other people interacting with the installation, talk about it within their

groups, and get over any evaluation apprehension that may have set in and finally move into close contact with the installation.

Once the users are in direct interaction, they begin to interact and play with the sculpture, moving around it, comparing their reflections on one side of the sculpture to another, lying on the ground, interacting with others in the area. In addition almost all of the users in direct interaction move into the center of the bean, where more exploration and interaction happens within the omphalos or concave chamber. The omphalos chamber offers a sanctum like space which due to the nature of the curvature of the 'bean' presents a complex reflection of the ground and the people standing below. It was observed that under the omphalos, users spend their time trying to understand the curvature, looking for their reflections in the surface, as well as photograph themselves, their reflections, and others in the chamber.

This behaviour of taking photographs was seen all around the installation. There is a strong urge amongst the users to continuously capture their interaction around Cloud Gate through photographs and/or video. Most of the interactions in and around the 'bean' structure were an attempt to perform for the audience, where one member of the group would capture the actions of the others' with the sculpture through photos or videos. This could either be in the form of simple poses in front of the bean with their reflection; or in the form of more complex antics and contortions to affect their reflections.



Figure 4.4 An example of a common antic - lying on the ground with a partner to capture a photograph of the reflection.

Role playing as an activity among users was also observed around the installation. Some users, especially those in large groups, would often take up leadership roles – targeting others to a certain kind of interaction, or devising a short game to be played around the installation and so on. A few users would continue to engage with the reflections - often by shifting their body positions in respect to their reflections; or positioning themselves as part of the reflected fabric; or role playing within the omphalos.



Figure 4.5 Varying levels of engagement around Cloud Gate – the periphery provides a place to sit and chat, or watch others engaging with the installation; the inner focal areas are opportunities for photographs, as well as physical contortions to change one’s reflection on the sculpture; and the omphalos provides a sanctum like space for discovery and reflection.

Throughout the observation period, novel ways of interaction and engagement were observed. A person’s engagement with the installation is dependent on his/her learning and adapting to the effects of the system. The individual goals (or what one is looking for) emerge only through continuous interaction and adaptation. Most users’ engagement with the installation is limited to viewing the multiple reflections that the installation presents. Many users simply walk away after this momentary interaction. Such momentary interaction may provide the necessary playful interaction and revelation for many users, however the ‘bean’ also offers an opportunity for long term engagement. Of reflecting on the city and the changes in the reflection as the day goes by. This behaviour could be seen in users who spend a lot of

time sitting in front of the 'bean' watching their reflection, as well as other people interacting with the installation. Often these people congregated in the periphery of the sculpture so as not to interrupt others who may choose to have a much closer interaction. Given that the artist has not laid out any form of suggested trajectory for interaction, any such interaction can be considered successful engagement with the installation.

Based on these observations several key insights were drawn. These insights helped to develop a higher level understanding of the behaviours explained earlier but also pose questions that helped in the second case study.

4.3.2 Insights from the Study

In using the framework the primary insight was the basic structure of the framework proved adequate and worked. It was clear that most users followed the Perception-Interaction-Engagement trajectory in their engagement with the installation. With this insight in place, the next question was did users follow the specific behaviours that were part of each part of the framework?

Within Perception, both *Evaluation Apprehension* and *Thresholds of Activity* were observed. Strong thresholds were established around the installation. All users exhibited some form of evaluation apprehension. However evaluation apprehension was most common in older users. Younger users were less likely to exhibit such behaviour. There was a drawback to the study, using purely observational techniques it was difficult to say if the users were able to perceive *Status of the Medium*.

Within Interaction, *Honey Pots* were very commonly formed even if not all the time. At Cloud Gate, Honey Pots were seen mostly among older users. They were often formed in the focal awareness zones and led to users moving into direct interaction. Clearly honey pots were a way for users with evaluation apprehension to understand the installation and decide if they

should move into interact. Given the highly interactive nature of the installation, different types of *manipulations* and *effects* were commonly observed. Novel interactions with the installation, creative contortions, and posing for photographs were some of the most common actions. In addition to such manipulations, users sometimes developed *strategies of use*. However given the simple level of interactivity involved, *role playing* was one of the few strategies that was consistently observed. One key insight from the Interaction phase of the framework was that all three behaviours in this phase are deeply inter-related. Observance of other people's manipulations and the effects of such manipulations were what users in *Honey Pots* observed, *strategies of use* were a way of testing *social embarrassment*, often allowing users to ease into the interaction with the installation.

The Engagement phase was the toughest to evaluate because it is difficult to say if a person is engaged or not through observations or interviews. One metric that can be used to define engagement is length of interaction – the longer the user chooses to stay at the installation, the more engaged the user is. As described earlier, some users engaged momentarily, while others engaged for long periods of time often from the periphery. Moreover it is questionable whether extended engagement is the same as deep understanding of the installation. One thing is clear in this phase, engagement is not assured nor is it automatic. Users moving from Perception to Interaction may not always enter into deep and extended engagement.

At the end of the study several such questions also came to light. Of particular import was the inter-relationship between behaviours in the Interaction phase. Is this relationship unique to this installation or can it be observed in other installations also? Will the introduction of computing change this relationship at all? Also important was the question about the engagement phase. Some people found the 'bean' engaging; they were able to interact with it, some going as far to extend it through observation from the periphery. However for most

users, momentary engagement at the installation was all that was observed. After that they walked away. It can be claimed that this is original intention of the artist. However the question still remains why a simple design like the 'bean' enables such variance in engagement? Do computing enabled installations enable similar variance? If yes, what aspects of these installations make them engaging? If not, what are aspects of computing based installations that differentiate them from the 'bean'?

A second case study was conducted to study these questions as well as evaluate how well the framework can be used when there is limited interactive capability in an urban art installation. The study asks how users approach such an installation, whether they perceive it is interactive and how they engage with it, by themselves or with others.

4.4 Case Study 2: Crown Fountain

Crown Fountain is a dynamic video sculpture designed by Catalan artist Jaume Plensa and constructed by Chicago's Krueck & Sexton Architects. The fountain opened to the public in July 2004, around the same general timeframe as Cloud Gate. The fountain is composed of a black granite reflecting (wading) pool placed between a pair of glass brick towers. The towers are 50 feet (15.2 m) tall and use light-emitting diodes (LEDs) to display digital videos of Chicago residents. These residents are shown as large faces that inhabit the two tower blocks of Crown Fountain. Throughout most of the warmer months, water intermittently cascades down the two towers and spouts through a nozzle located on each tower's front face. The strategic location of the nozzle makes it seem as though the water is coming out of the mouths of the large faces displayed on the two screens. In short, the faces 'spit' water at random intervals.



Figure 4.6 Crown Fountain, with users in different modes of interaction – waiting on the side benches watching others interacting, taking photos of the fountain and people, and directly interacting with the fountain.

Since its unveiling Crown Fountain has proven to be a very popular congregation destination for both residents of the city and visitors. Critics in city have applauded the idea of a dynamic thematic fountain in the middle of the city because of the contemporary urban nature of it. The contemporary feel of the fountain comes from both form and implementation – as a computing enabled installation the fountain presents an interesting and imposing view for the people on Michigan Avenue and visitors to Millennium Park. When dark, the LED displays light up this area of the park and thus acting as a landmark for most tourists and residents of the city. The fountain is visited by both transient visitors, people coming from other parts of the world to visit Chicago as well as regular users who know the fountain and its dynamics. In summer months many regular users come prepared to interact with the fountain, in swimsuits and with beach toys for the wading pool.

From Cornock and Edmond's (1979) framework Crown Fountain can be viewed as a *dynamic-passive system*. Its displays constantly present changing images of people's faces. But the installation offers limited interactivity, only incrementally more than Cloud Gate. It is not designed to sense movement or interaction and respond. In fact, its video system is internally programmed to a randomizing function. The images are not regular and different faces have different time intervals after which they spout water. A control room with high-definition video servers and equipment temperature sensors automatically perform tasks such as determining when the face will pucker and, if weather conditions permit, when to turn the water on and off. The two towers display two different faces, each with their own characteristics and idiosyncrasies. But it was seen that there are four states to video: a passive screen (displaying a nature scene – like a waterfall); a passive face (displaying one of the faces but in passive stance – looking around, blinking); an active face (signaling the possibility that water might spout soon – through gestures such as pursing of the mouth, closing of the eyes); and finally a spoiler face (taunting the public when water does not spout as expected).

Spatially, the fountain has three main areas - the fountains themselves are situated at the two ends of a large wading pool which forms the main participation area. On both sides of this rectangular layout is seating for the general public. There is also space in the rear of the two vertical towers that continues the wading pool. Even though the artist/architects clearly had an intention of extending the spatial context of the fountain to the rear of the towers, there is a very clear understanding among users of where the activity zone is.

4.4.1 Observations at Crown Fountain

A similar process and methodology of user observation was followed as the first case study on Cloud Gate – fly-on-the-wall observations were made over multiple times of the day over many days; notes, photographs, and sketches made and used for analysis. The PIE framework

was used as the basis for observations and evaluation. Insights were derived from the observations, particularly to respond to the questions that emerged at the end of the first case study.



Figure 4.7 Users can be seen in all three Thresholds of Activity - peripheral awareness can be seen in the passersby who walk past the fountain, focal awareness is seen in the people who stop to watch what is happening in and around the fountain – on the benches or against the rails, and direct interaction can be seen in the children playing in the wading pool or waiting for the fountain to spit water.

Most visitors start their interaction with the fountain through peripheral awareness (Figure 4.7). As the fountain spikes their interest, they move slowly into zones of focal awareness, where they congregate with other members of their group to look at and discuss the interactions that go on in the fountain. Most of these users stood against the railings on the side of the fountain or near the benches around the fountain. A few “adventurous” visitors would eventually transition from the focal awareness zone into the direct interaction as they moved in to the wading pool. This action was accompanied by a high probability that they

would get wet and meant that they had to make this choice carefully. Interestingly the edges of the wading pool provided a physical demarcation for direct interaction. If they chose to cross this threshold, they would be in the midst of young children playing in the water, or stand under the spout of water. The *Thresholds of Activity* framework proved useful for understanding how people engage with the fountain through these thresholds.

From the data collected, it was observed that younger children were the most likely to move to direct interaction with the water spout. They stepped into the wading pool and almost immediately ran to join the other groups of children already in the fountain. Instances of such interaction varied based on time of the day but could happen almost regularly, every 5-10 minutes, in the afternoon and evening periods. The older teenage groups tended to be more wary of doing the same – an instance of *evaluation apprehension*. Almost all of them would take their shoes off in anticipation of interaction as they moved into focal awareness but whether they interacted with the water depended on how willing their peers were to experimentation. The older adults tended to stay away from direct interaction, more comfortable at a distance - in the focally aware zones. However, this was not *always* the case; it was noticed that adults who arrived at the focal awareness zone to watch their children then sometimes joined them, i.e., moved into direct interaction with the Fountain.

Honey Pots formed all around the fountain (see Figure 4.8). This happens when visitors are in the focal awareness zone with groups of people creating a strong social “buzz” around the fountain. Users who come to the fountain for the first time often go through this ritual. Even though the fountain offers limited interactivity, users face *evaluation apprehension* about what might happen when they move into interacting with the fountain. The *Honey Pots* provide a relief mechanism, allowing the users to discuss what is happening with others in a similar predicament. The discussions almost always revolve around the faces, the antics of the

users, and interest in moving towards direct interaction. People engaged in Honey Pots often used the other participants in direct interaction to evaluate their position and what was demanded of them. In this manner, the inter relationships between these behaviours observed earlier in Cloud Gate were also observed in Crown Fountain. In many instances, while standing on the sides observing these Honey Pots, users were overheard as referring to the faces as a he or a she. In other cases, references were made to “spitting” instead of referring it to as a fountain or a spout of water. This anthropomorphic projection was interesting because metaphorically this is what the designer intends the installation to do – “spit” water.



Figure 4.8 Honey Pots can be seen on both sides of the fountain in this image. The groups were formed from users moving from peripheral interaction to focal interaction. In this case, the Honey Pots were formed from mostly strangers who gathered around the installation.

The faces displayed on the screens are not static. The faces play different roles and different faces may have different characteristics. Once users realize that the fountains “spit” water, for most of them, the faces spouting water become the key activity associated with the

installation. It is novel, unique, and exciting. It also explains why the faces are projected on the displays, and why they move through contortions. Also now that they see that the spitting only happens occasionally, it provides them with something to wait for. Because of this, all the manipulations and actions on the field revolve around this event. Although the fountains do not respond to their immediate actions, users display several different types of *manipulations*-waving of hands, kicking, prodding were all observed. Countdowns till the faces spit water were another kind of manipulation seen in the anticipation phase. Often, one member of the group will start the countdown, at a random time and from a random numeric starting point, and others might chime in. Most such manipulations were by children individually or in groups. Sometimes, very rarely, young adults may also join in these manipulations. The countdowns became a social activity, something the users could do while they waited for the fountains to spout water. It also provided relatively unfamiliar users in the same space a familiar activity to do.

Each tower has its own face. The faces stay on for a short period of time. During this time they move, twitch, contort, and tease the users. When they eventually spit, they do it at the same time. Even though the water spout is synchronized between the towers, users might run from one face to the other in anticipation that one would spout quicker than the other. Users quickly learn that both the towers spout water at the same time. However some users find that behaviours are different for the different faces, and some faces are easier to judge than others. Many of the faces taunt the users through facial expressions; they make it seem as though they are going to spout water. But then they don't and continue with the contortions of their face. Some of the faces may even be outright rude, poking their tongue out to tease users instead of spitting water. Once users become aware of the mechanics, they begin to compare the faces at the two fountains. If one face is harder to interpret, users often look to the other face to see if they can determine when it will spit. Users had their own response to

the gestures of the faces. They too would gesture at or imitate the faces. Manipulations of younger users could range from gentle prodding to more aggressive kicking or punching of the towers.

Role playing is another strategy of use that was seen among users engaging in activities around Crown Fountain. One of the most common roles was that of the leader – a strong participant who rounded up other participants (often young children) to engage in group activities (Figure 4.9 and Figure 4.10). These activities may be egging the face to spout, finding the most appropriate position to stand when the spout is engaged, or playing mini-games amongst themselves when nothing was happening. Another role is that of the teacher-apprentice (mostly seen in young adults) where one participant would take the role of a teacher to explain the nuances of the interaction to another participant or a group of participants who had just joined the interaction.

Other strategies such as *parallel, co-coordinated, and highly co-coordinated* were observed. Most of these strategies were adopted by groups of users. Young children often originated these groups in an attempt to band with each other in anticipation of the spitting. The groups could be ad hoc groups constructed on site or groups of people who come to the fountain together. As is common with most such interactions, once formed, the groups start to perform for the audience. The consequence of interacting directly with the fountain is getting wet. For most of the younger children in direct interaction, once the spout appears the objective is to remain under it for as long as possible. These children would often turn to the audience to show how long they can stay under it, or different actions they can perform. Sometimes spatially constrained, children jostle and push to position themselves in the best possible region. For many other users, the fountain became a background for photo opportunities. Many of these users, often teenagers or older adults would rather not take a plunge but chose

to register their presence through these photographs. After the photograph many of these users stayed back to watch as the users in direct interaction played with the fountain.



Figure 4.9 Children form co-ordinated groups that play together or wait for the spout. Manipulations during this time can range from countdowns till the water appears or more active gesturing, prodding, even kicking.



Figure 4.10 Once the spout is activated, the focus is on getting under the water. Getting wet for as long as possible is the objective at this point.

4.4.2 Insights from the Study

Once again it became clear that the PIE framework could be used to evaluate such installations in public space. The Perception-Interaction-Engagement trajectory was evident in the users and many of the specific behaviours that comprise the framework were seen among the users of the fountain.

Given the highly visible result of engaging with the fountain (the face spits on you, in public), *evaluation apprehension* was observed in most users. Users that did not exhibit apprehension appeared to be familiar with the fountain and knew what to expect. Due this evaluation apprehension, strong *Thresholds of Activity* were also set up around the fountain. An interesting insight was that the spatial arrangement of the fountain facilitated these thresholds to form easily. People were able to demarcate these zones themselves based on some very specific spatial thresholds. For example the outer benches and railing allowed

people to transition from peripheral awareness to focal awareness. If they chose to interact, the wading pool was the spatial threshold to cross in order to move into direct interaction. Once in the wading pool, they had already crossed the threshold from focal awareness to direct interaction. In most cases, this was physically symbolized by the high probability of getting wet, and eventually choosing whether or not to stand below the spout. *Thresholds of Activity* (Brignull and Rogers 2003; O'Hara, Glancy, and Robertshaw 2008) are proposed as behavioural thresholds that users have to cross. The spatial ordering of Crown Fountain suggests that it is possible to design physical infrastructure to demarcate these thresholds and facilitate the transitions. While these physical demarcations need not be obvious, they could help in the decision making process of users as they cross from one threshold to another.

To counter evaluation apprehension, *Honey Pots* were common around the fountain. These were usually formed when one or two users join together to talk about and understand the installation. Given the open public space around the fountain *Honey Pots* did not seem to be limited to a specific spatial geography but instead could form almost anywhere. However the largest numbers formed closer to the fountain, just outside the wading pool. There was no discernable difference between the different *Honey Pots* that formed around the installation. All of them had the same basic mechanics and almost always signaled that one or more of the individuals would move into interact with the installation.

Several *manipulations* and *effects* were noticed around the fountain as described in the Observations section. An important insight is that even though the fountain offers limited interactivity, it is unpredictable in nature. As seen in the different manipulations, different users respond differently to this unpredictability. The talking, prodding, and kicking actions symbolize an active response; parallel countdowns in small groups, and other such *strategies of use* symbolize a passive response. However both show that the unpredictability provoked

people to engage more. This is especially true as the crowds gathered and the participants started *performing for the audience*.

An insight from the previous case study at Cloud Gate that was confirmed at Crown Fountain was that behaviours in the framework are inter-related. Any changes to one behaviour influenced the others in the phase. For example, *thresholds of activity* around the installations had impact on *Honey Pot effect* and *spectator use*; and getting over *evaluation apprehension* informed the user on what to *expect* and how to *adapt* to the system. While a large variance of creative behaviour was observed in terms of engagement at Cloud Gate, a similar variance was not observed at Crown Fountain. Even though the fountain was computing enabled, it provided limited interactivity to users. Because the designers have proposed a clear trajectory for engagement, new participant trajectories were different to compose and engage in. This meant that users at Crown Fountain, unlike those at Cloud Gate, could not get creative with their interaction. The following section will compare the two installations to see if other such similarities and differences can be discerned by mapping engagement against the framework.

4.5 Key insights from the Study

Since the two studies were done separately, at the end of the analysis process the observations from the two studies were brought together and were compared. This was done specifically to look for generalizable insights that could help the framework evolve. What can we learn from comparing two public art installations? How might the PIE framework evolve based on such a comparison?

Three important general insights came to light from such a comparison.

4.5.1 Transition from Peripheral Awareness to Focal Awareness is toughest

While *Thresholds of Activity* were visible in both cases, it was observed that the transition from the peripheral awareness threshold to focal awareness was the toughest for people to make. Many people walked away from the installations while in the peripheral awareness phase. This transition signals the entry into the interaction phase and thus is a very important transition in terms of such installations. While several factors such as an ability to ascertain the status of the medium, disinterest, apathy may play a role in this transition – *evaluation apprehension* is often the most significant factor. *Honey Pots* are a useful tool to counter such evaluation apprehension and move into focal awareness and eventually into direct interaction. Once the decision to transition into focal awareness was made, transition into direct interaction was easy. Once again *Honey Pots* played a large role in this transition as well. Almost all the people in focal awareness eventually transitioned into direct interaction.

4.5.2 Physical infrastructure can aid transitions between Thresholds of Activity

In Brignull and Rogers (2003) as well as O'Hara et al.'s (2008) work, Thresholds of Activity are artificial or behavioural thresholds set up by the users. In both of those studies, no physical thresholds were designed around the installations. In the case of the Crown Fountain study, it was clear that physical demarcations had a role to play in the setting up of these thresholds. While not exact, the boundaries established by the benches and railings around the fountain formed the boundary at which peripheral awareness ended and focal awareness began. Similarly the edge of the wading pool formed the physical demarcation when people knew they were moving from focal awareness into direct interaction. Beyond this line, you will get wet! These observations suggest that physical space may have a role to play in the setting up of thresholds and even perhaps in aiding the transition between the thresholds.

4.5.3 Engagement is not always automatic

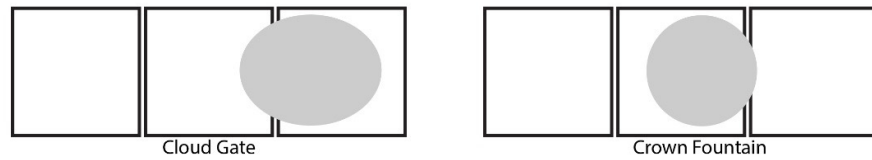


Figure 4.11 A comparison of engagement in the two installations based on the PIE framework

At the end of this study the two installations were mapped against the original framework. From such a mapping it is clear that Cloud Gate, even though it is a static installation lends itself more towards engagement than Crown Fountain, a dynamic installation (see Figure 4.11). Public installations have a transient characteristic; they are seen as installations with which you have a momentary experience and then move on. In both Cloud Gate and Crown Fountain, there were instances when users would interact with the installation, and then move on without actually engaging with it. This behaviour was particularly noticeable in Crown Fountain. On the other hand, it was clear that more users were excited by the "bean" and willing to explore more aspects of the installation and its context. Perhaps the biggest advantage of Cloud Gate, a static installation, over Crown Fountain, a dynamic installation is that Cloud Gate does not present users with any perceivable goals or target objectives. And in doing so, it maintains an ambiguous relationship with the users and stays open to interpretation. Through such explorations, people try to make sense and reflect upon their interactions – perhaps less so than where it is more obvious as to what is happening at an installation, water will spout at certain intervals. The 'bean' on the other hand encourages more creative behaviour, by encouraging people to explore more and lie on their backs, etc. Through such explorations, users are able to construct individual representations which enable meaning making and reflection. In both cases, it is clear that the social ecosystem and

technological context in which the installation is contained has a large role to play in how it is perceived and interacted. Operationally it also suggests that behaviours in the framework have clear associations, some are constructed into the medium or installation, while some are brought to the interaction by the users. Designers have control of this and can influence how much information is encoded into the installation and how much must be added by the users.

4.6 Discussion

In this chapter a framework is first developed using information gathered as part of the literature review. This framework is used for the evaluation of two public art installations in the city of Chicago. The public art installations provided an easy first step for this research as the insights generated from the studies can be used to evolve the framework for future studies. The insights highlight the role of ambiguity and explicitness in interactive public installations. The range of ambiguity versus explicitness is an important factor for designers to consider when adding interactivity to their installations. How might this range impact experience? Experience gains meaning only from its situation—connected to other artefacts and events and the perception of the user. Thus, by its very nature, embodied experiences with interactive systems is as varied as the individual people who interact with them. In fact some of the behaviours expressed in the framework may come from users, while some come from the medium itself. This is further connected to the different motivations people may have when interacting with interfaces and abilities and limitations of the installation. Noë (2000) claims that when we experience something, we are aware of a densely detailed world, but we do not take all that detail in our consciousness all at once. Instead, the seeing, the experiencing of all the details is a temporally extended activity. Furthermore Edmonds et al. (2006) claim that engagement is the result of an active and constructive process of interactions with an installation or other users.

Can public installations be constructed such that experiences at the installations are a result of information build up from engagements with other users rather than by engagements prescribed by the designer? When users can actively engage and collectively change the overall experience of the installation itself, do they engage more or less? What kinds of creative behaviours do users exhibit in cases where the experience is temporally extended? These are important questions because they shift the essential construct of the installation itself - what is encoded into the installation, what is brought by the user to the installation, and what evolves from interactions with the installation will be different.

This was the primary consideration in the next study – a prototype installation where the lessons from this study was applied and evaluated at a prototype installation for *public creativity*. This study evaluated what happens when visitors to an installation are encouraged to be creative themselves – where they actively engage and collectively change the installation and their own experiences with it.

Chapter 5. Post-it Note Prototype

In the previous chapter, two existing art installations were used as case studies to evaluate the PIE framework. Both case studies provided valuable insights into the validity of the schematic framework. Users moved through the perception-interaction-engagement phases in both the installations. Secondly, it was found that the individual observations from initial research could be applied to each of the public installations and also influenced each other. It was seen that while the transition from peripheral awareness to focal awareness was a difficult one, once users made this move, they were much more likely to move into direct interaction. The Crown Fountain study showed that the physical environment can aid in the recognition of and transition between thresholds of activity. And finally, it was clear that engagement is not assured, nor is it automatic in this user trajectory. In fact whether a user engaged with an installation was dependent greatly on the different attributes that are encoded into the installation, in conjunction with what the user brings to the interaction.

5.1 Extending the PIE framework

Based on these observations, the initial framework can be revised. Figure 4.11 represents an extended PIE framework revision.

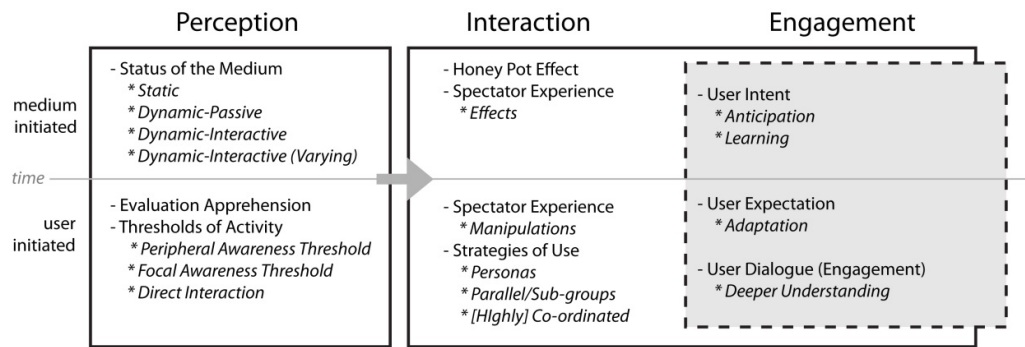


Figure 5.1 The extended PIE framework based on the case studies

This extended version features three important changes, all based on the insights from the two previous case studies.

- 1) The first change in the framework is the addition of time as a factor which determines the move from Perception into Interaction and Engagement. The addition of this strengthens the representation of the framework for both generative and evaluative uses.
- 2) The second change is a proposal that engagement is not automatic. By shifting the representation of the Engagement phase into a dashed line box, it suggests that designers should not assume engagement will always happen. Most users in public spaces interacting with installations will move along the Perception-Interaction trajectory. Only some users will move into an engagement phase. This change is based on the third change, some behaviours are encoded into the installation, while some behaviours are brought to the interaction by the user.
- 3) The third and most important change to the framework is the division of behaviours into two part, some behaviours are “medium initiated” while some behaviours are “user initiated”. Such classification allows designers to decide how much information to encode into the installation during the generative instances of the framework.

It must be noted that some behaviours in the framework like Thresholds of Activity, Honey Pot Effect may be both encoded within the system and/or brought by users. This duality is on one hand impossible to notate in a representative framework and on the other hand provides opportunities for designers to approach different contexts differently.

A focused study was deemed necessary to test out the framework in a controlled, yet in-the-wild environment. In order to do considerable time was spent in the design of a prototype installation, such that its situation and construction would enable the validation of the revised framework. The installation was designed to be interactive using low-tech materials and engage passersby, by capitalizing on existing contextual cues in where it was located. The primary question for this study was to look at what happens when users are empowered to become creative, wherein the installation does not present interaction prescribed by the designer, but rather it emerges from the activity of other users. A motivation was to develop an interactive installation that engendered constructed experiences, collective co-creation of content, and the transformation of this content in near real time. In this thesis, this is referred to as *public creativity*. By this is meant social constructions of user generated and collaborative content at public interfaces. It is an extension of collective (group) creativity where the creativity comes from aggregated construction of user generated content *in public spaces*. As installations shift from being 'looked at' to engaging people more in a diversity of interactive ways within a social structure, new lenses and metrics will be needed to study their behaviour, especially as they engage in public creativity.

Some of the questions that this installation sought to answer are:

- 1) What mechanisms encoded into the installation, and brought by the user help in the building of public creativity?
- 2) Do users engage more or less if they are asked to create their own experiences?

- 3) Are there new behaviours seen at such public creative installations that can help in the evolution of the PIE framework?

In order to respond to these questions, the following Post-It note prototype was designed as both a tool for evaluation of these questions as well as generation of new insights to evolve the framework.

5.2 The design of the Post-it Note art installation

The prototype Post-it Note art installation was housed in the main reception area of IIT Institute of Design. The prototype was deliberately placed in a “public” area of the school, where it was accessible to students, faculty and visitors including potential collaborators, corporate/industrial/research partners, and potential student applicants. The rationale for locating it here was to provide a visual focal point in a high traffic zone, indicating a change in the normal environment and a call to interact.

The design of the installation was based specifically on the PIE framework and specifically to answer some of the questions listed above. The installation titled “Post-it note Art” asked users to add content one post-it note at a time such that over time, through collaboration and social interaction, a larger composition would evolve. Design elements in the installation such as the post-it note, and the screen were chosen to evaluate how public creativity would affect interaction. The primary assumption here was that this gradual buildup of information in the form of aggregated content would allow people to develop their own understanding of what to do or create. This was done specifically to test if the evolving installation would suggest interactions to users from the work of other users instead of being prescribed by the designer as seen in the previous study.

To encourage public creativity no specific instructions were provided as to what to do or how to interact with the installation. Instead two signs were placed in the space; one said “Post-it collaborative art” and the other was a disclaimer note which said “You are being watched” to indicate to users that’s they were being recorded. Any formal construction of intent or goal was intentionally left to the user to work out. This was deliberate; to determine if the contextual position of a public installation suggests to users the purpose of its existence; and if users evaluate public installations from its construction and context to form a representation of what must be done.



Figure 5.2 The installation at an early stage showing the different parts – the box, and the screen.

The physical installation was composed of two parts (see Figure 5.2) – a box, made of black foam core, serving as a placeholder for content creation; and the screen, constructed from white foam core with a light grid pattern, which serves as a placeholder for content aggregation and display. The box fulfills multiple purposes: it is a place to hold post-it note

packs and pens; it is a place where users can create content. The screen, on the other hand is designed to act as an aggregator of information, where people can build up new information, add to existing information, or simply transform what is already there. The screen was hung on the wall; very faint grid lines on the screen suggest that post-it notes can be positioned on the screen using the grid pattern. This was intended to suggest to people where they might place the post it notes. Interaction at the installation is very simple. A potential user can come up to the box, pick up one of the post-it notes, and draw, or write, or construct a pattern using the provided pens. This user can peel the post-it and post it on the screen (see Figure 5.4). They can do this in response to something that is already there or to start a whole new thread of activity.

Based on the PIE framework, the space in between the box and the screen was intentionally left empty to allow for people to gather and discuss what was happening on the screen. This space, if at all, would allow for users to overcome evaluation apprehension, as well as coordinate with others as to how to interact. In the previous study it was seen that physical thresholds could aid in transitions between Thresholds of Activity. The empty space in front and in between the installation were intended as areas where people might gather to form Honey Pots, or move in to observe the manipulations and effects of users as they interact with the installation. The box and the screen were also designed to act as physical objects around which transition from peripheral awareness to focal awareness, and from focal awareness to direct interaction might occur respectively.

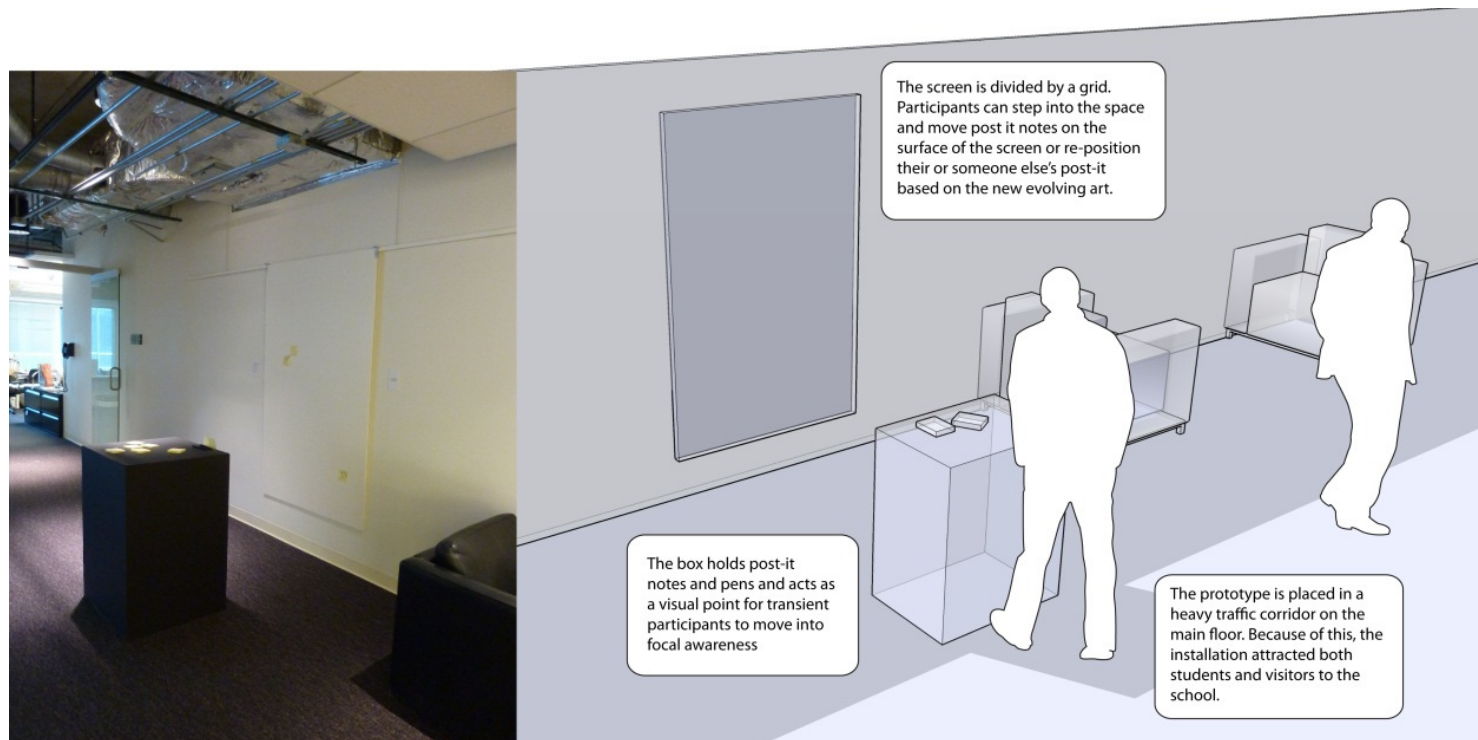


Figure 5.3 Design schematic and photograph of the prototype installation placed in context

A number of assumptions were behind the design of the installation:

- 1) *It is contextual* – the school has a history of using post-it's for various design purposes. Moreover as students, faculty, and most visitors are used to prototypical research projects in the building, the interaction models should be largely familiar to the target population.
- 2) *It is social* – the installation invites people to interact at a social level by reading and changing/adding to what others have left behind.
- 3) *It is collective and incremental* – people will build on the work of others. There is no correct answer and so interpretations are personal, subjective and constructed over time.
- 4) *It is interactive* - people will interact with the information, change it if they want (it is constructed of post-it notes after all). Even though, it only resonates interactive technology, analog interaction at the installation can be translated into digital space eventually.
- 5) *It is episodic yet continuous* - the direct interaction with the installation is episodic however the overall experience continues over time. People will come back to find out what others did; how others expanded their sketch; and since it is a tight community even talk to others to find out why they did what they did.



Figure 5.4 A user posting information on the installation

5.3 User study

The framework was used to evaluate the behaviours observed and the user study helped in turn, to refine the framework. The focus of the user study was to investigate whether and how public creativity takes place. Two broad themes were examined:

Contextual behaviour

The purpose of the study was to understand composite behaviour of users and patterns of engagement. A “fly-on-the-wall” observation study was chosen for this purpose. A small non-intrusive webcam with a motion detector system was set up. This camera captured a series of low resolution stop motion photos (see Figure 5.5) every time someone moved or interacted

with the installation. The area of capture was slightly larger than the installation in order to observe the movement of passersby, as well as behaviour of individuals and groups in nearby spaces.



Figure 5.5 Examples of stop motion photos from camera that captured user activity around the installation

Content generation.

To examine how the setting impacted on user engagement and the way users added and aggregated content was analysed, the screen was photographed at periodic intervals (see Figure 5.6) – to see how content developed and to look for patterns of behaviour. Analysis focused on how user behaviour affects content generation and how existing content affected behaviour.



Figure 5.6 Example of content progression on the screen

5.4 Observations

Over a period of three weeks, an average of about 40 people passed by the installation every day. The camera recorded the actions around the installation. It must be noted that not all passersby interacted with the installation. Only when users moved from peripheral awareness (walking along the corridor) to focal awareness (stopping to look at the installation), it was counted as an interaction. On average, 10-15 unique instances of interaction per day were observed. These figures include the congregation of groups where large numbers of people may accumulate around the installation. These numbers increased on days when visitors came into the space. In general, a visitor was more likely to interact with the installation than a regular passer-by.

It must be noted here that the nature of the study (fly-on-the-wall) meant that the observations were limited to post-event reviews of user actions, and many of the assumptions that follow are based on a positing of what may have happened on the ground. To reduce chance of over-simplification or guesswork, the assumptions were intentionally limited to behaviours listed in the PIE framework, which itself is based on insights derived by other researchers in public interactions. Due to limitations of time, no follow up studies were

done to ascertain these behaviours. Furthermore, using the PIE framework as the basis for assumptions could have affected the interpretation of some behaviours but enabled an evolution of the PIE framework as will be seen in later chapters.

What was observed has been described in the following sections from the two themes described before – contextual behaviour and content generation:

5.4.1 Contextual behaviour

Many interactions at the installation were individual. Most passers-by stopped to watch the *manipulations* of other users but did not move forward to interact. Some people would stop periodically to see how the content had changed without actually modifying the content themselves. This observation suggests strong *thresholds of activity* being set up around the installation (see Figure 5.8). The physical space around the installation aided in this, as the thresholds were established mostly in the empty spaces between the installation (see Figure 5.7). In almost all cases once users crossed the threshold of peripheral awareness into focal awareness, they were most likely to move into direct interaction.

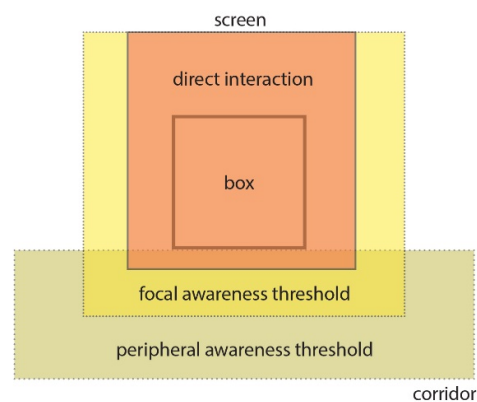


Figure 5.7 Thresholds of activity around the prototype, showing how the spaces between the artefacts acted as physical thresholds

When group interaction happened, it was almost always preceded by a group of people who joined together in conversation. While difficult to confirm from the data available, it was assumed that such a grouping signifies the formation of a *Honey Pot effect*. Groups of people would assemble in the space in front of the installation to try and figure out the *manipulations and effects* of users interacting with the installation. An inevitable result of the *honey pot effect* was that one member of the group would move into interact with the installation. This often resulted in others discussing the person's action; leading to others in the group moving into interact as well. In most cases, this transition from focal awareness to direct interaction was much more likely to happen if the *honey pot effect* preceded the interaction. On several occasions *teacher-apprentice* models were seen being set up in groups of people – experienced users explained to new passers-by the installation, (their perception of) expectations, *manipulations* required to interact with the system, and the *effects* of these manipulations. This happened outside of *honey pots* or just before a *honey pot* formed.

The honey pot effect manifests itself when more than one person congregates and attempts to understand the installation (see Figure 5.8). Such a social grouping also helps users to ascertain the level of social embarrassment among the current peer group, and the degree of transaction required through social interaction. Because such an evaluation happens before actual engagement, the honey pot effect is a strong signifier of people moving in from focal awareness to direct interaction with the installation. It also indicates when one person in the Honey Pot has crossed this threshold, others will soon follow suit.

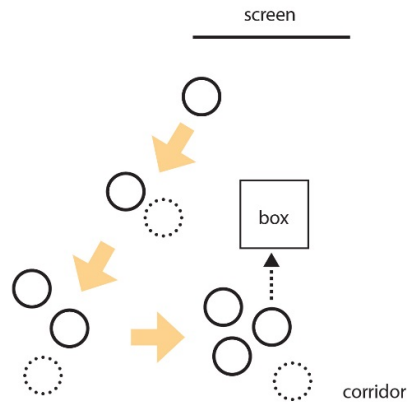


Figure 5.8 Mechanics of the Honey Pot effect showing relative position with regard to parts of the installation.

In terms of context, users in the space clearly understood the installation’s purpose as an art installation project. In one instance, a group of people were observed getting together to use the box as a place to talk. During this time, they did nothing to affect the installation.

Sometime later they realized that they were hindering activity at the installation and moved away to another spot to work.

When at the installation users looked for clues in the environment as to how to use the interface. This was evident when contextual cues such as the situation of the installation in conjunction with explicit messages (such as the limited signage) helped users to move into interaction. When users found these cues and messages to be lacking, they would look for clues within the content itself – to figure out what to do based on what others had done before. In the studies, users were seen as looking for more information, and inevitably looked at existing content before they added their own content. Also it was observed that for a short period of time at the start of the installation no content was generated at all. This changed when a few post-it notes as “seed” content were plated into the installation. Sometimes clues in the form of *manipulations* of a user currently interacting with the installation influenced user behaviour. In some cases, users would follow existing patterns of use – following what the

person in front did. However more often than not it allowed them to construct their own representations of what should be done, deviating from existing patterns to creatively come up with a new content.

5.4.2 Content generation

The first instances of content were mostly individual – very often artful renderings, sketches, cartoony representations of contextual elements. There were also some written pieces – speech bubbles or artful representation of type. However, over time collaborative pieces started to appear and multiply. Some of these pieces were collaborative completion of artistic renderings which indicated a lot of time was spent on content generation. Most were quick sketchy extensions of previous sketches. Some content pieces were clearly intended as generator pieces (intended to start a thread) while others were clearly continuation pieces (continuing an existing thread) or stand-alone pieces. Not all generator pieces were continued – several generator pieces were not followed up on many parts of the screen. We also noticed that some users would come back at regular intervals to see if others had added to their initial input. The grid was almost rigorously followed but post-its breaking the grid appeared periodically. While a few post-its changed position, it is difficult to say if this was done by the post-it note generator or someone else. But in general users seldom changed, destroyed, or added on to a post-it note someone else had created. If they wanted to make a change or comment, they chose to use a new grid position altogether.





Figure 5.9 Examples of content generated at the installation over time showing how much of the content was derived from the work of others before. Any shift introduced by a new person adding a different type of post-it prompted a whole new line of content to generate based on the same format.

The following chart (see Figure 5.10) tracks the trajectory of content over the period during which the installation was setup. The two axes track number of post-its on the installation against time. Important events are notated in the form of circles. As mentioned previously, in the beginning no new content appeared. This changed when seed content was added to the installation. Seed content was also periodically added to the installation to keep the momentum going. These instances are notated in the form of yellow circles. Green circles indicate events which led to interesting content shifts, such as someone breaking the grid, or collaborating to create new content. Red circles indicate events which had a strong impact on interaction, such as pens disappear altogether.

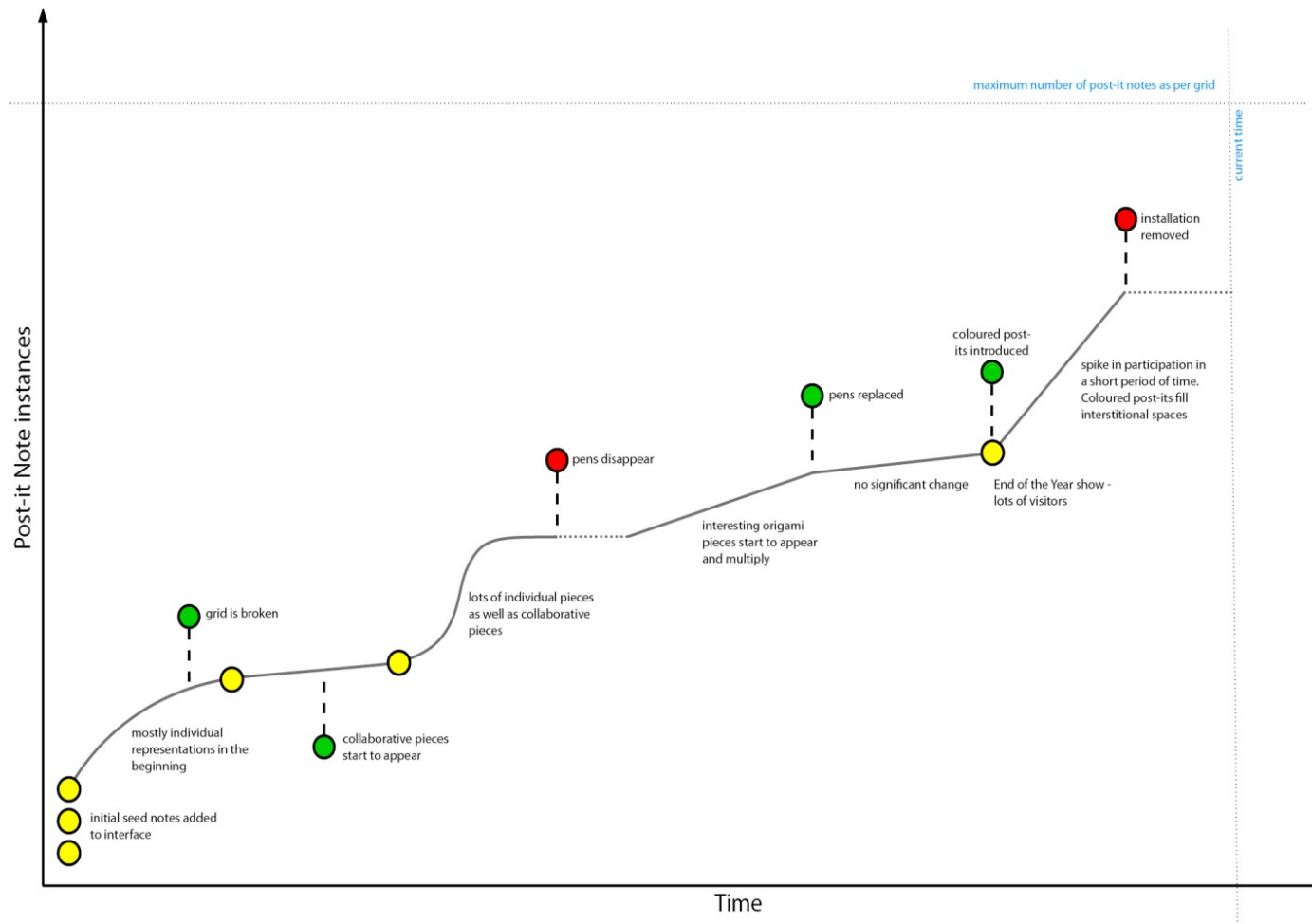


Figure 5.10 A timeline graph plotting change in user generated content at the installation against the time taken for the changes to appear. The graph also shows significant milestones in the installation during this timeframe.

The following events are of specific importance in Figure 5.10:

- 1) *Pens disappear*: At a certain point, all the pens placed in the holder in front of the board disappeared. For a short period of time this meant that people did not have a means of writing or drawing on the post-it notes. Some passers-by looked for pens and on not finding any, would walk away. One result of not having anything to write was that soon people started creating 'origami' pieces with the post-it notes.
- 2) *Origami pieces appear*: The first origami pieces were experiments but soon they multiplied until a majority of the new content was origami-based. Origami pieces are interesting also because they offered a new type of collaboration mechanism for users. Pens were re-introduced after some time to see if people would continue to create origami pieces or revert back to writing and sketching. Not only did origami pieces continue to appear, other post-it note versions which did not use the pens started to appear. One of these used a coffee stain instead of writing or sketching, some used composite origami-pen techniques.
- 3) *Colour post-it notes are introduced*: In the beginning colour post-its were intentionally avoided. The period of inactivity suggested that a new prompt was required for action. The introduction of colour post-its also coincided with the End of Year show at the school where there was an increased number of visitors. At this time, there was an increase in the number of pieces that were added to the board but no relative change in the type of content that was generated. Color post-its were mostly used to fill empty spaces.

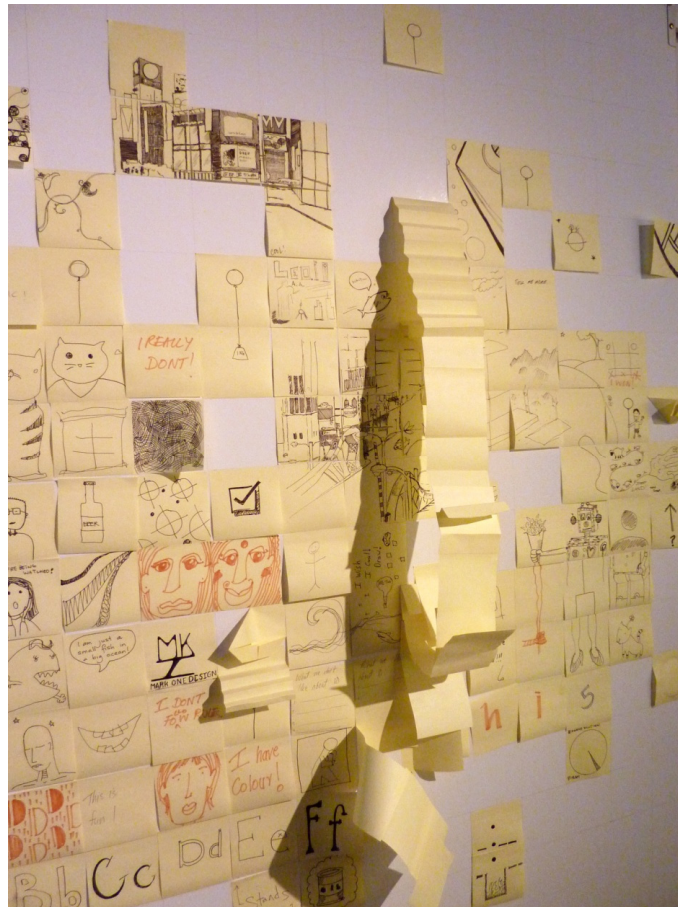


Figure 5.11 Example of origami pieces that appeared when the pens were removed

5.5 Key insights from the Study

This project was explicitly designed to extend the study from case studies to a designed prototype installed in a public space. Insights from the first two case studies, namely the importance of physical space in thresholds of activity, and the mechanics of the Honey Pot Effect, were illustrated further through this study. In addition two key insights from this study are important to note:

5.5.1 Ownership of user generated content

Several user behaviours suggest that people respect ownership in a public installation (especially one designed for public creativity). In the installation users in general refrained

from changing, mutating, or re-positioning the post-it notes that were placed by someone else. New post-it notes were added next to others, commenting on other post-its but people never defaced or added graffiti to existing content. This showed that (at least within this particular context) people viewed post-it notes as belonging to or authored by someone. This kind of authorship suggests a line of communication is being established; changing content generated by someone else is a negative behaviour, akin to interrupting when someone is talking.



Figure 5.12 The installation at a later stage as more post-its start to appear, each providing users with new information about how to interact at the installation. Specific location of most post-it remained the same as new content appeared, showing that users respected other people's posts.

5.5.2 Cues, Messages, and Signals

Another insight from this study was the role of cues, messages, and signals in a user's understanding of public installations; especially those that do not provide specific and clear interpretation of what they are for and how they should be used and experienced. In her upcoming book, *Signals, Truth & Design*, Judith Donath⁷ presents several layers of non-verbal communication that she argues helps users to translate contextual information into usable information. Cues, Messages, and Signals is a derivation which allows not only researchers to understand how users develop a model of interaction, but also for designers to design for new models of interaction.

From the observations in the Post-it note study, a framework including cues, signals, and messages suggests the following interpretation:

Cues – Within spatial installations, people look for contextual cues to understand an installation and develop *user intent*. These cues can be spatial (where an installation is located) or experiential (how the installation is situated within a particular location). A brick out of place in a pile of bricks in a construction site presents completely different cues to the user as same installation is placed in a museum. In the case of the above installation the position of the board and the box, its location in space, and the grid lines on the board formed cues that people used to comprehend the installation. The absence of pens suggested to people ways of being more creative about how content could be generated. The introduction of color post-it notes was a cue that users did not have to depend on single color post-its to construct their art and that they could use the color of the post-it to add to the art.

⁷ This is an unpublished book proposal. One of the chapters *Signals, Cues, and Meaning* published on her website and presented as lectures is used here for the derivation of *Cues, Messages, and Signals* (<http://smg.media.mit.edu/papers/Donath/SignalsTruthDesign/SignalsCuesAndMeaning.pdf>)

Messages – When users have processed contextual cues, they look for explicit messages to supplement their interpretations. Messages are direct information that are provided to the users by the interface. In most installations they take the form of signage or pictorial instructions that explain how to use the installation. The more messages that are provided, the less interpretive the system becomes. Messages may be in the form of explicit information (such as instructions) or in the form of example interactions (such as automatic replays). In the case of the installation, the information on the wall, signage, and seed content formed the messages. Messages in tandem with experiences also enable users to construct or re-construct *user expectations*.

Signals – When there is an absence of messages, users look for signals from a variety of sources to determine how to approach an installation. Norman refers to these as social signifiers (Norman 2008), suggesting that we use such signifiers to construct models in real life. Signals may come from existing patterns of use; signals may also be in the form of *manipulations* of other actors and the *effects* of a system/installation in reaction. Users may depend on others to explain it to them, or appropriate a direction from interacting with others in a *honey pot*. In the case of the Post-it Note installation, the first origami posts suggested to others that it was acceptable and appropriate to create posts, without using pens.

In sum, the context for public creativity can be viewed as a combination of its location and situation (which enables participants to understand the space in which the installation resides) and cues, messages, and signals. These can trigger memories on the part of the user leading to their understanding of the installation that informs their subsequent interactions.

5.6 Discussion

In this chapter a prototype Post-it Note installation was designed, implemented, and evaluated using the frameworks developed so far. The Post-it Note installation is important because it

was built specifically for this study using the framework. Observations using the original framework provided a more in-depth understanding of experience and engagement at public installations, as well as user behaviour. One of the insights that came to light is that context can be broken down based on what is encoded into the installation, and what the users bring with them to the interaction. The following figure brings these two sets of information together into one framework:

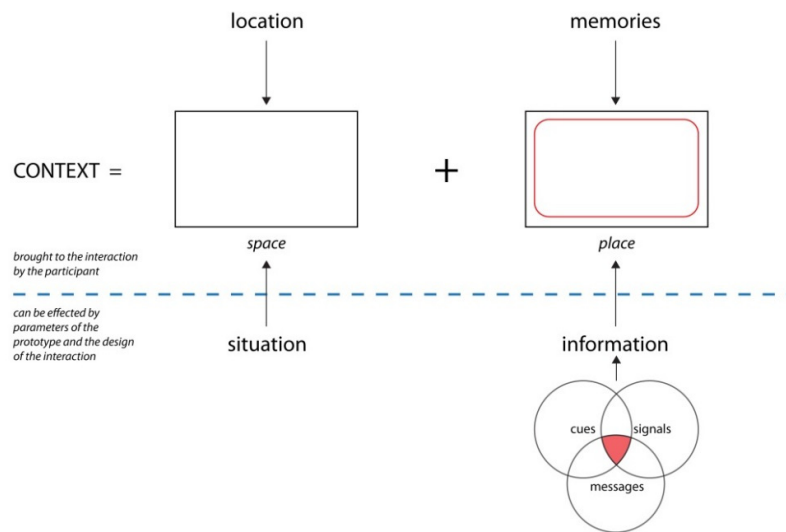


Figure 5.13 Context Augmentation Framework created to describe the context of an interactive public installation.

The top line shows what users bring to the interaction – information about location (the spatial location) of the installation and memories, biases and attitudes (place based information), which allow the user to pre-construct an idea of what the installation will do based on where it is. Imagine for example an installation built into a railway station. The fact that the installation is located in a railway station introduces a certain expectation of what the installation is and what it might do. Now imagine the installation is located at the Grand Central Station in New York City. The memories associated with this specific place changes how the user approaches the installation, and what the expectations are.

The designer can influence this understanding by changing parameters of the installation and the design of the interaction. The lower line shows what the designer might do to affect perception of and interaction at the installation. For example, the designer has the ability to shift the situation of the installation in the railway station by placing it next to the platform where the train arrives, or next to the ticket counter, by hanging it from the ceiling, by placing flush with the floor. All of these situational conditions present differing interaction options to users. Perhaps the most important aspect of the installation that the designer can affect is the information associated with and built into the design. This information as seen in the last section can be further broken down into cues, messages, and signals. Cues are intuitive codes built into the design of the installation – a button which flashes may prompt users to approach and touch it. Messages are explicit instructions associated with or built into the installation – the button might say “touch me.” And signals are information decoded by users by observing others using the installation – if another user touches the button and interacts with the installation, the user now knows that the button can be touched.

The framework presented in Figure 5.13, referred to as the *Context Augmentation Framework*, can be used by designers in both generative and evaluative forms. In its generative form, the framework allows the designer to come up with innovative ways to situate the installation in an already decided location, and design the information (cues, messages, and signals) that accompany the installation. In its evaluative form, the designer can break down an existing installation by evaluating its location, and situation; as well as information brought to the interaction by users and those presented by the installation.

In terms of public creative installations, ownership of content is another important attribute which must be a serious consideration in design. Who owns the content once it has been authored? Does the user own it? Or does the installation appropriate it? If the user owns it,

then can they edit their content once it has been created? These decisions may lead to completely a different user experience from if users can only access content and review/read it. If the installation appropriates the content, is it visualized as one unit of the multiple that may be generated, or is the whole representation an aggregate of all the content that has been collected? When an installation encourages public creativity, content determines the overall experience; because content changes over time (it may be added onto or removed from), this experience may also change. New participant trajectories may also emerge as these changes occur. Designers must be conscious of all of these details when designing for public creativity. But does ownership of content change when there is a large number of participants? Does the location and situation of the installation affect ownership of content? Does choice of technology play a role in how users perceive creative content?

While these important insights were used to create a new context augmentation framework, the Post-it Note study was clearly limited. Even though the installation was an in-the-wild prototype, it was controlled, and had several limitations in scope and outreach. Situating the prototype in IIT's lobby limited the number and kind of users that could experience the prototype. Also, it was designed to *echo* technology but not be technological in its construct. While an extrapolation can be made of how the experience of this prototype can inform a technology augmented experience, it would be different if the set-up was an interactive digital prototype.

At this point it was decided that a more in depth, in-the-wild testing was needed for develop the framework. An opportunity arose when the Chicago Loop Alliance requested a technology-based experience for a two week art event in the Chicago Loop district called Art Loop Open. The following chapter (Chapter 6) describes the design and evaluation of a large public installation for Art Loop Open in a real world urban setting. Around the same time, the Chicago

Loop Alliance also approached me to explore how public installations could be built to engage audiences on the street. To address this question studio class was offered to design students at IIT Institute of Design that asked them to develop new public installations on Chicago's State Street. Chapter 7 describes the design of this class and evaluation of how designers appropriated the framework as a means of generating interactive public installations. These two studies extend the lessons from this chapter in two different ways – one, by using them to design and evaluate a large scale implementation in downtown Chicago, and the other, by evaluating how designers appropriate the framework in the generation of new designs. The two pathways lead to very interesting insights and result in the re-framing of the framework, as seen in Chapter 8.

Chapter 6. Art Loop Open

The previous studies in this thesis introduce a framework for the generation and evaluation of interactive public installations. This was done first through literature review, and then through a set of case studies of established public installations. The previous chapter extended the framework and showed how it can be useful for the generation and evaluation of a prototype installation in a controlled environment. Additionally, the installation also introduces the concept of a public creative installation where interaction is constructed from the actions of other users rather than coming from the designer. Two important insights were illustrated; ownership of content - in a public creative installation where experiences are created through the action of users over time, the question of who owns the content becomes one of importance; and second is that context for such installations come from two sources, one brought to the interaction by the user; and the second encoded into the installation in the form of cues, messages, and signals.

6.1 An augmentation to the PIE framework

At the end of the previous study, the extended PIE framework remained unchanged. However for the next two studies, an augmented context framework was added as an extension to the PIE framework to describe the design of context.

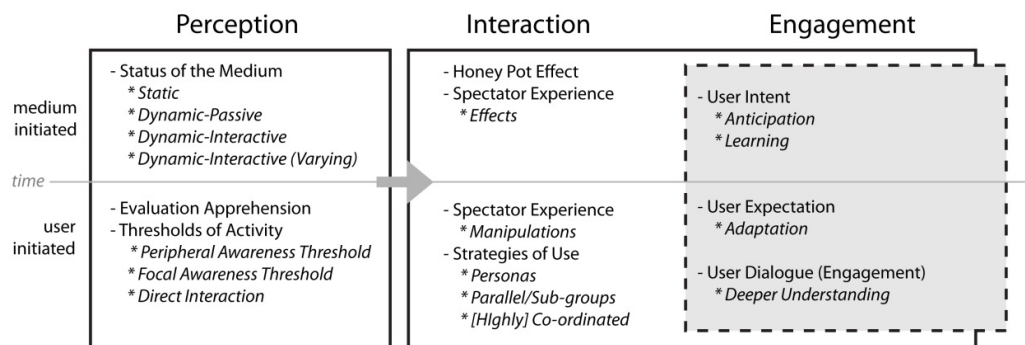


Figure 6.1 The extended PIE framework remained unchanged

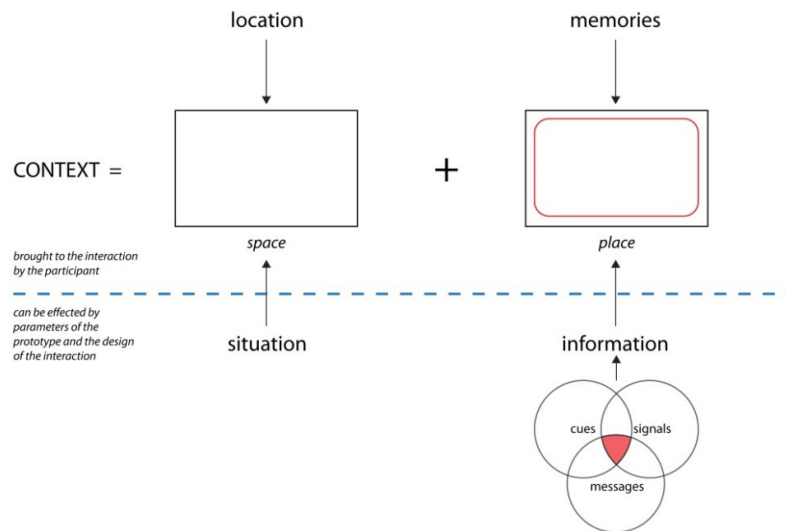


Figure 6.2 The new context augmentation to the existing PIE framework

Figure 6.1 and Figure 6.2 show both the extended PIE framework and the context augmentation together. As can be seen the PIE framework stays the same but the context augmentation framework introduces a breakdown of context as the combination of information brought to the interaction by the participant and information constructed at the installation by the participant based on the parameters and the design of the installation. It also introduces the concept of Cues, Messages, and Signals as essential components of information encoded into the installation.

An issue with the Post-it Note study was that it was a controlled prototype limited in its scope and outreach. It could not be used for the evaluation of user behaviours in large scale public installations, especially those installed in the wild in actual urban settings. This meant that a larger study was needed to test the validity of the framework and understand user behaviours in the wild. In the Fall of 2010, the Chicago Loop Alliance approached IIT Institute of Design to design and develop the user experience for an innovative city-wide art exhibition called Art Loop Open. This project provided an opportunity to design and evaluate a large scale public

installation in the city of Chicago using the lessons from the research so far. It also allowed for extending some of these lessons by posing the following questions:

- 1) Can the frameworks developed from studies so far be applied to large scale public installations in actual urban settings?
- 2) How can the framework be extended to support temporally extended experiences?
- 3) What role does ownership of content and Cues, Messages, and Signals play in the user experience at a large scale public installation.

The following sections describe the exhibition in detail – elaborating the design process, the installation of the experience at an urban mall in Chicago, user experience, observations, and eventually the insights derived from the installation.

6.2 Art Loop Open – an in-the-wild public creative installation

Art Loop Open (ALO) was an innovative city-wide art exhibition designed with the intention of mobilizing the general public to engage with art, artists and each other (*Art Loop Open*).

Modeled on the very successful Art Prize in Grand Rapids, Michigan (*ArtPrize*), ALO had 191 unique pieces of art juried and exhibited across 13 different venues in the Loop district of Chicago. According to the Encyclopedia of Chicago, the Loop is the popular name for the Chicago business district located south of the main stem of the Chicago River. The name apparently derives from the place where the strands powering cable cars turned around on a pulley in the center of the city (*The Loop*). The Loop has historical significance for Chicago because it is the seat of power for the government of Chicago and Cook County and it houses the historic theater and shopping district along the historic State Street (*Chicago Loop Alliance*). The venues were selected from the 200+ merchants and included high profile stations such as Macy's Flagship Store, the historic Palmer House Hotel, the Burnham Hotel,

the Hard Rock Hotel, Merchandise Mart, among others. Target population for the exhibition were the millions of people who work in and visit the Loop district including more than 65,000 students, 500,000 office and retail workers, 50,000 theater goers, and countless conference attendees and tourists. During the exhibition, audiences were invited to begin free registration in September, visit venues and vote on the artwork during the two week period of October 15-29, 2010. During the first round of voting, viewers could vote for as many artworks as they like. During the second round, viewers were only able to vote once, and select from the Top Ten Finalists' pieces. One of the primary motivations behind ALO was to bring art into the open and to communities who might not otherwise go to the art. What better canvas to do this than the fabric of a city? The choice of using high profile venues in the city (such as Macy's) ensured that *accidental interactions* (O'Hara, Glancy, and Robertshaw 2008) with art and the technology occurred. The intention was that people, who come to shop, should stop to view the art; and people who come to see the art, should move into the Loop's many venues to shop and eat.

ALO provided an excellent and visible opportunity to test out frameworks by prototyping a located experience in the wild while building in lessons from the previous two studies. There was a significant interest from the very beginning to make this event technology rich. One purpose of this was to use the platform to study how the urban population in the Loop would react to interactive placemaking. Thus one important design criteria for the design of ALO was that technologies must bring people to the Loop to physically view and interact with the art and the technology. The large population that visited ALO provided a rich and diverse group for the study of interactions, and behaviours, both individual and group, as well as the ability to compare these behaviours across in the wild technology installations.

Three important organisations played leadership roles in the design of the ALO experience. The Chicago Loop Alliance was the organisation that brought the project to IIT Institute of Design. The Chicago Loop Alliance is a Business Improvement District (BID) organisation whose primary role is to maintain and improve the Loop district of Chicago. With Art Loop Open, Chicago Loop Alliance was primarily involved with venues and spaces for the event. Another organisation known as the Chicago Artists Coalition worked with the artists and jurying process. Microsoft was the third organisation involved and they provided very critical support for the design process from the very beginning including access to innovative technologies, as well as critique of the design process on a periodic basis. Other development partners helped with the thematic design of the exhibition and associated experiences.

6.3 Designing the ALO experience

Art Prize, the event on which ALO is modeled, is promoted as part arts festival, part social experiment; an international art contest decided solely on a public vote. The schematic of the Art Prize was made available as an open source model for others to appropriate and transform based on their specific context. When Chicago adapted this model, significant changes were made to distinguish ALO from Art Prize:

- 1) The art was selected through a formal jury process which included renowned art critics in the city.
- 2) A programming committee assigned art to the different venues and worked with the venues to adapt spatial conditions to the display of art.
- 3) A technology layer would be used to enhance the overall experience of the event – not just in the voting, but also the extension of the experience beyond the exhibition.

The period of design for ALO was about 6 months, from beginning (when the project was announced) to end (period of the exhibition). Most of the planning process was conducted during the summer months (June, July, and August) in a team of four postgraduate students guided by me. At the end of this design process, the team had eight unique personas, each representing a personality type of the population that would potentially attend the conference. The personas spanned from low tech to high tech in terms of their technology use and device appropriation. The design of Hub37, the central location was based on the PIE framework and the context augmentation framework discussed earlier in this chapter. The design team specifically used lessons from previous studies to build out the space and the arrangement of technology in this space. Scenarios of use were built for each of these personas based on Conifer Research's 5 E's model (Conifer-Research 2004). The model helped to think of how each of the personas might be *Enticed* to *Enter* into the event; how they might *Engage* at the event, *Exit* from the event and *Extend* their experience after the exit. This process allowed the team to build an experience map of each persona as they move through the ALO event, as seen in Figure 6.3. The differing technology ability of each of the personas meant that they experienced ALO differently; and based on which aspect of the experience they chose to enter through, they come into contact and use technology in many different ways, and exit from the experience differently.



Figure 6.3 Mapping Personas on an Experience Map for the ALO event. The personas all had differing technical abilities and thus experienced ALO differently.

The design of ALO and its associated experiences provided an opportunity to implement and test several layers of technologies. As can be seen in Figure 6.3, there were there were several combinations of physical and virtual interactions built into the ALO experience. These interactions can be broken down into two key types of technologies:

- 1) *Located*: Located technologies are interactive systems that have “place”. By this is meant that such technologies are interconnected in such a way that their specific location adds meaning to the interaction. Observations highlighted specific aspects of crowd behaviour, interaction trajectories at a technology rich space (Hub37), and the preference of an urban population for analog vs. digital media.
- 2) *Distributed*: Distributed technologies are non-located, and distributed either in physical space or in virtual space. These technologies are intended to polarize non co-located people around specific interests. The tagging and voting system, the commenting system for each art piece, and Twitter are examples of distributed technologies. Observations of the use of such technology showed how user generated content is constructed in urban contexts and at specific events like art exhibitions. During the observation phase, it was also interesting to see (if/) how these experiences were extended by users over time.

6.3.1 The ALO experience

A user’s first interaction with ALO starts from the Art Loop Open website⁸ where users could search for information about the exhibition as well as develop an agenda for their trip using the Microsoft Pivot application. Pivot is a proprietary application from Microsoft that allows users to visually categorise and sort through large amounts of data very quickly. Using Pivot,

⁸ The website is not functioning any more. At the time of the exhibition it was hosted at www.artloopopen.com.

users could categorise the 191 pieces of art based on a few selective criteria and re-arrange them based on medium, venue, artist information etc. and a combination of criteria. For example, if a user has interest in photography, the list can be sorted to make sure the agenda hits all the photography pieces at the exhibition. At the exhibition, all 191 pieces were connected through a tagging system. In this particular case, MS Tags were chosen instead of QR code because of their ability to track device IDs (see Figure 6.4). The fact that users can scan the MS Tag with their phone was specifically designed to cater to a range of technical skills from “I have a smartphone but do not know how to use it” to “I am pretty good at using my smartphone”. Once scanned, the tags led users to the micro-site of each art piece, where they could find information about the art, the artist, and comments from other users about the piece. They could also use this micro-site to vote for the piece if they liked it. Users had the option of an SMS based voting system where they used a piece specific number to text their vote.

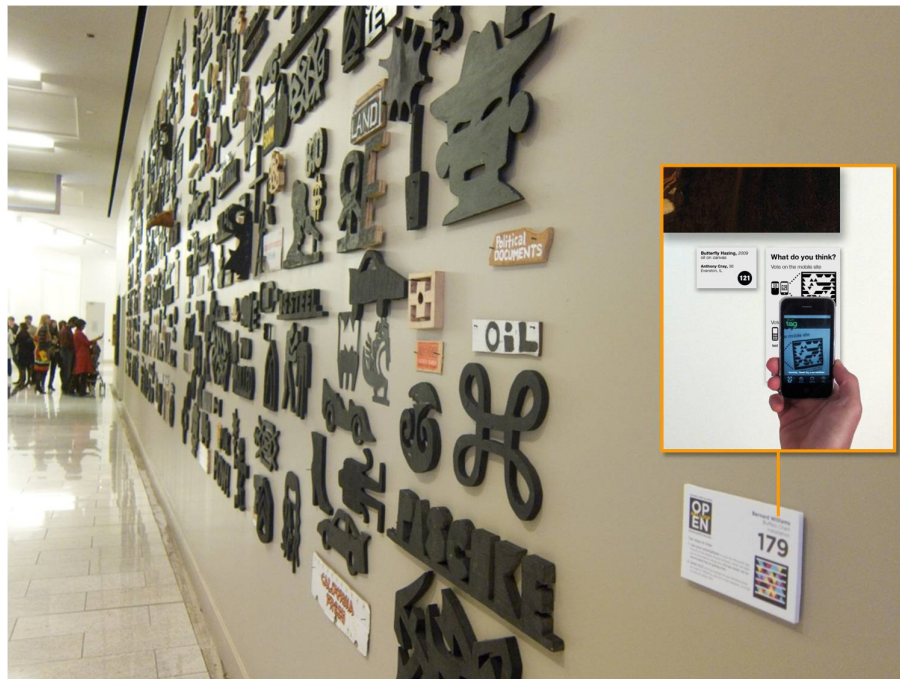


Figure 6.4 An example of the distributed tagging and voting system installed at ALO

6.3.2 Hub37 – a located public creativity space

At the pedway level of the urban mall Block37 a hub, called Hub37, was designed to act as the central location for the ALO experience (see Figure 6.5). The pedway is a transit corridor (connecting two subway lines), citizens coming into the city and going back home could stop at Hub37 to find out more about the exhibition. Hub37 was seen as a located space within the total ALO experience where the total user experience could be focused. Based on the Post-it Note study in the previous chapter, Hub37 was designed as a public creative installation. Different technologies were used in the design of the Hub37 experience to accommodate a range of potential users. These ranged from the completely low tech (the analog CommentWall), to the medium tech (Pivot Table, and the Surface Tables that are technology enabled but still intuitive), to the high tech (TwitterWall), all explained in detail below (see Figure 6.6).



Figure 6.5 Hub37 as installed in the context of Block37 urban mall

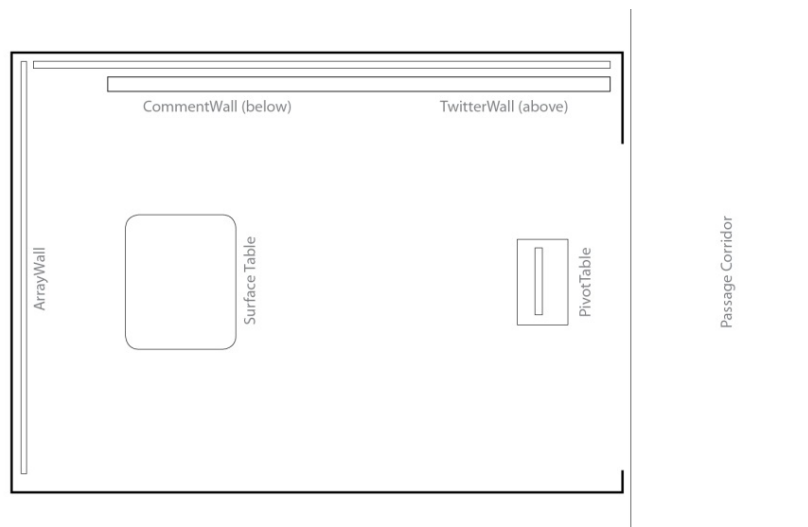


Figure 6.6 A plan view of Hub37 showing the position of different technologies.

As users walk into the Hub, they come in contact first with a Pivot Table, a touchscreen interface with Microsoft Pivot (see Figure 6.7). At the Pivot Table, users can use Pivot to reorder the pieces as per their preferences. The Pivot interface ran an application similar to the one on the website but touch enabled so that low-tech users could use the system as well. This application allowed users to search through all 191 pieces of art, list and sort them according to specific criteria they might have. For example, a user could list all the pieces that were generated by students from the School of the Art Institute of Chicago and see where they are located.



Figure 6.7 Users interacting at the Pivot Table using the touchscreen to categorise and sort artwork based on their preferences.

Behind the Pivot Table was the ArrayWall, a long wall with all 191 art pieces arrayed in small squares, arranged by venue – all the pieces in one venue are of the same color and grouped together (see Figure 6.8). The ArrayWall was designed to give a broad picture of Art Loop Open and see all the pieces in relation to each other. It also allowed users to search for any one

piece of art work and find out more information about it. Each unit on the ArrayWall had two layers – one a base layer with the image and the information, and on top of that was a corresponding magnet (see Figure 6.9). The magnet could be peeled off and taken to the (analog) CommentWall where messages can be added to the piece or to the Surface Table where they could use it to query for more information.



Figure 6.8 An Art Loop Open user peeling a magnet off the ArrayWall which laid out all 191 art pieces in an array. Each art piece was indicated by a colour denoting its location, a number, and a short description.



Figure 6.9 Detail showing how the magnets on the ArrayWall work in two layers.

The CommentWall (Figure 6.10) located to the side of the ArrayWall was designed to cater to low tech users who preferred not to use complex technology at the exhibition. It consisted of a simple whiteboard with markers. The wall was magnetic and the specific magnet could be posted on the wall to become the starting point of a discussion. The CommentWall was directly based off the Post-it Note study and incorporated many of the insights from that study. Once they have placed a magnet, users could add comments about the piece or about Art Loop Open in general. No instructions were provided to the users, only that they could use the wall to express their opinions. A Microsoft Surface table (Figure 6.11) located just in front of the ArrayWall provided users access to digital information for each art work. Placing the magnet on the table pulled up information about the piece and online comments generated around the piece. The Surface Table and the magnets also allowed users to share information with each other by moving different magnets around on the table and using them as conversation starters. The Surface table was designed as a method for users to learn more about each art work, while the CommentWall was seen as an outlet for information users wanted to convey about each piece.



Figure 6.10 Commenting at the CommentWall involved placing a magnet on the wall, picking up a marker, and writing or sketching around the magnet.



Figure 6.11 The Surface Table allowed the users to interact with each other using the magnet as a conversation starter.

A large video screen on the side of Hub37 projected the TwitterWall (see Figure 6.12). TwitterWall's basic display was a large art visualization. The art visualization is an aggregate visualization constructed from tweets containing #ALO. When a user tweets a comment about one of the pieces TwitterWall pulls up tweets and recognizes a tweet's "temperature" (positive or negative), number of characters, and the "influence" of the tweet (how many followers they have). This information is then used to change the size, color, and quality of spots and lines which appear on the visualization. Each tweet was represented by its own spot or line, its dimension, colour, position varied based on the information gathered by the algorithm.



Figure 6.12 The TwitterWall where each tweet that appeared was algorithmically analysed and translated into a spot, or a line of a large art visualization.



Figure 6.13 User activity at Hub37, people crowding along the Pivot Table, the Surface Table and reading comments on the CommentWall

The elements of Hub37 were designed specifically to respond to the extended PIE framework. Messaging in the space was consciously designed to see if users are able to gauge and incorporate Cues, Messages, and Signals. The spaces in between technologies were intentionally designed to allow the formation of Honey Pot effects, appropriation of Thresholds of Activity, and congregation of users. The insight that physical elements can aid in transition between thresholds resulted in the design of clear physical demarcations that separate the thresholds of peripheral awareness and direct interaction. How users reacted to this demarcation and how physical infrastructure plays a role in these transitions is elaborated in sections that follow. The CommentWall is a direct evolution of the Post-it Note installation and was designed to continue the evaluation of how people in urban spaces engage in public creativity. Newer elements such as the ArrayWall, the Surface Table, and the TwitterWall are also designed so that specific aspects of the framework, namely Manipulations and Effects, Coordination Strategies, and Thresholds of Activity can be studied.

6.4 User study

Similar to the Post-it note study, user study of ALO was also conducted at two levels:

Contextual behaviour

The purpose of the prototype was to continue to understand composite behaviour of users and patterns of engagement. And so continuing from the Post-it note study, a similar “fly-on-the-wall” method was adopted. To do this a small non-intrusive webcam with a motion detector system was set up in front of Hub37. This camera captured a series of low resolution stop motion photos every time someone moved or interacted with installation. The area of capture included some of the transition space in order to observe the movement of passersby and the behaviour of individuals and groups in nearby spaces.

Content generation.

At a secondary level, the broad implications of the public setting and how users aggregate content in public spaces was also important. To evaluate this, the whiteboard was photographed at periodic intervals and tweets on the TwitterWall were recorded to see how content developed and to look for patterns of behaviour. A few intercept interviews were also conducted to find out specific motivations for users’ actions in the space. Intercept interviews are unstructured interviews with users as they experience the installation in the wild. The purpose of these interviews was to ask questions regarding a specific action they may have performed. While specific quotes were not recorded, these interviews helped to clarify a specific action that a user performed or understand behaviours that were unique.

It must be noted at this point that the 191 art pieces that were exhibited at Art Loop Open were not important to this study. User study was only done to see how users reacted to the technologies available to them at ALO, and specifically in Hub37.

6.5 Observations

Art Loop Open lasted for 14 days, from Oct 15-29, 2010. During the course of the event, Chicago Artist Coalition counted nearly 12,000 votes and estimates that roughly that many people, and likely more, visited one or more of the venues and engaged with the art. In a survey of the 191 artists that exhibited at Art Loop Open, 82% of reported that they not only visited Hub37, but felt it, along with the smart phone voting technology, were effective methods to reach audiences and share extensive information about themselves and their work. Over the 14 days the exhibition stayed open to the public, the stop motion camera in Hub37 recorded a 21,263 camera clicks, which roughly translates to about 354 minutes of user interaction data. Actual number of people in Hub37 was difficult to estimate but Chicago Loop Alliance estimates that the pedway at Block37 sees 1000's of pedestrians each day, many of whom likely stopped by Hub37 at some point during their travels. Additionally, Art Loop Open ended with a closing party, the one invite-only event of the exhibition. This party help in Hub37 was attended by 532 people as per Chicago Loop Alliance's record. Fly-on-the wall observations noted several 100 people interacting with the technologies in Hub37 during key periods of the exhibition. Around 7 intercept interviews were conducted during this time. These numbers show that a large number of users were exposed to Hub37 and many of them interacted with the technologies present in the space.

As with the Post-it Note study, it must be noted again that the nature of the studies meant that the observations was restricted to post-event review of user actions. Many of the observations that follow are based on logical assumptions of what may have happened on the ground. In the case of ALO, the researcher was physically present to listen to conversations, as well as engage in intercept interviews with users. In most cases, this helped to clarify questions of "why" someone did something. However the observations are intentionally limited to the behaviours in the PIE framework to limit chances of over-simplification of user behaviour. Due

to limitations of time, no follow up studies were done to ascertain these behaviours.

Observations from the study are described below based on the criteria explained above:

6.5.1 Contextual behaviour

The first level of observations analysed behaviours at a spatial level. To do this information from the study was mapped onto the plan view of the space (as seen in Figure 6.6).

In terms of layout mapping, one of the first tasks was to identify thresholds of activity. Once again clear thresholds were set up by users around the interactive installations, as seen in Figure 6.14. From the camera study, it was observed that moving from the peripheral awareness threshold to focal awareness was the most difficult, but when that transition was made, users quickly moved into direct interaction. Additionally the maps of the thresholds clearly show that the physical objects in the space were significant in the transition from one threshold to the other. This corroborates the findings in the previous two studies that physical infrastructure can aid in the transition between thresholds of activity. Honey Pots often formed in the focal spaces and direct interaction spaces (see Figure 6.15) and proved to be clear indicator of users moving from focal awareness to direct interaction. The mechanics of the Honey Pots formed around the installation were similar to the ones observed around the Post-it Note installation. The Honey Pots often formed around the installations that necessitated some learning – such as the Pivot Table, the ArrayWall and the Surface Table. On the other hand, the installations such as the CommentWall or the TwitterWall which were (or looked) familiar to users did not see Honey Pots forming as often. One interesting observation made here was that relative strangers were also likely to form Honey Pots. This is in line with observations in the case studies described in Chapter 4 where a similar behaviour was observed. It can be inferred from these observations that Honey Pots are not limited to users who know each other, but can also form between relative strangers especially in public spaces.

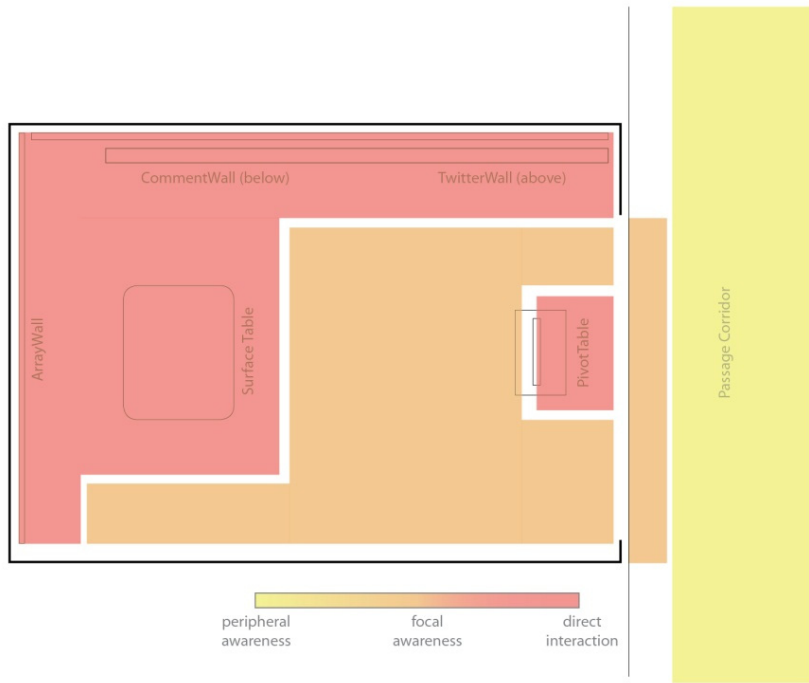


Figure 6.14 Clear Thresholds of Activity set up at Hub37, based on the position of technologies in relation to the passage corridor.

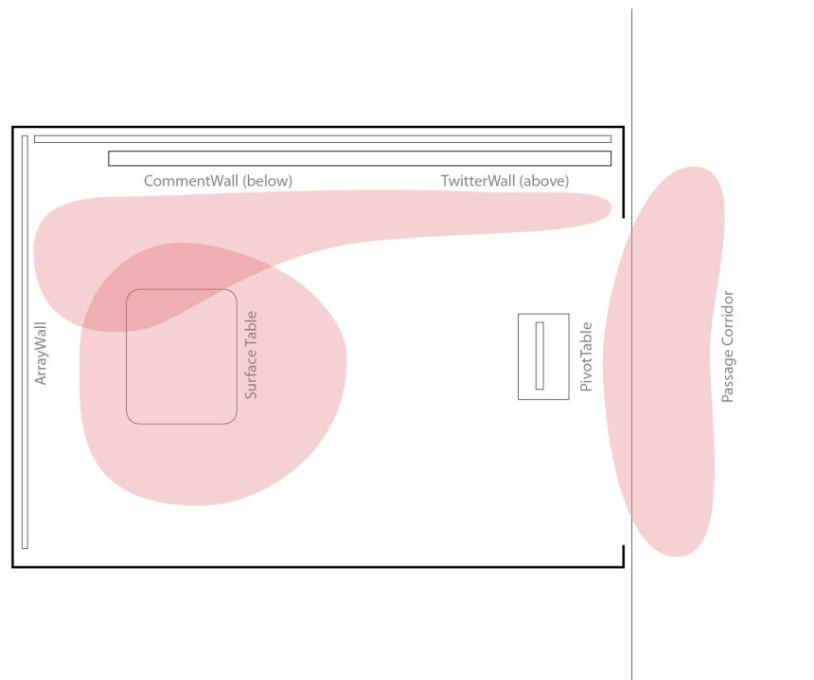


Figure 6.15 Zones where Honey Pots tended to form were around the technologies that needed learning

Directional flows helped to track what order users used the technologies in the space, particularly to see if any one technology influenced the use of the other. In mapping directional flows in the space, two flows stood out as most common among the many that users preferred. In the first, users moved to interact with the Pivot Table first, and then onto the ArrayWall, the Surface Table and then the CommentWall in that sequence. In the second preference, users noticed a magnet or comment on the CommentWall, peeled it off the CommentWall, took it to the Surface Table, returned it to the CommentWall and then moved to the ArrayWall to look at more pieces of art. These preferences can be seen illustrated in Figure 6.16 and Figure 6.17. The mapping of directional flow preference one was likely influenced by the design of the space. But it is also interesting to note that in the preference 2, it was the information that drew people in rather than lay out of physical infrastructure.

As is evident from Figure 6.18, the maximum amount of activity indicated by crowding of people took place in the high interactive (direct interaction) zones. The only area that broke this trend is a zone outside of the Hub space where users would often form Honey Pots to evaluate the interactions. Some users in this space would use the opportunity to talk to the on-site CAF representative questions. Some installations in Hub37 seemed to be more popular with users than others. Figure 6.19 also shows the activity around the interfaces mapped from least busy to most busy, an aggregate of all usage over the period of two weeks. As can be seen the ArrayWall and the Surface Table were the most popular and most used of all the technologies while the CommentWall was second most popular and used.

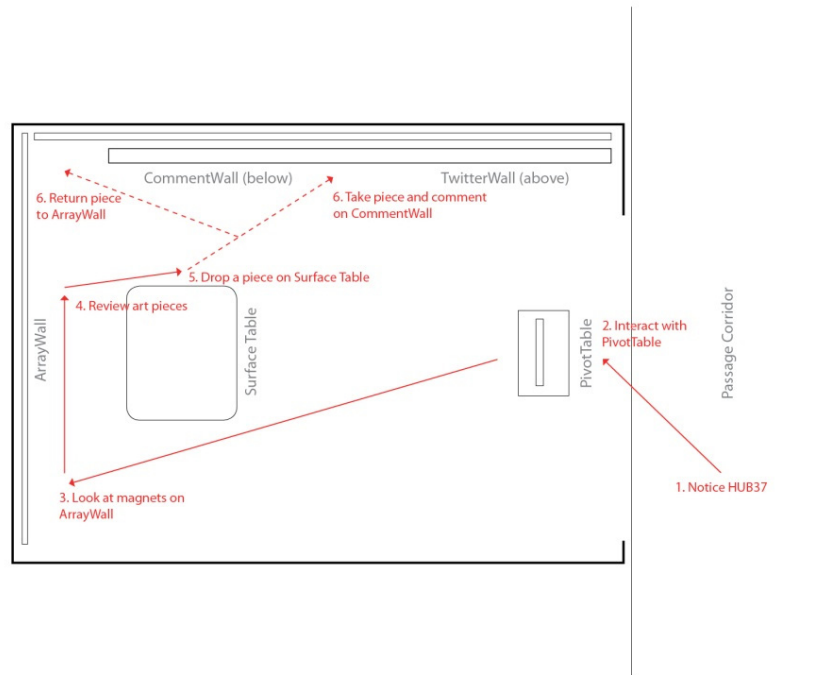


Figure 6.16 One potential trajectory for users entering Hub37

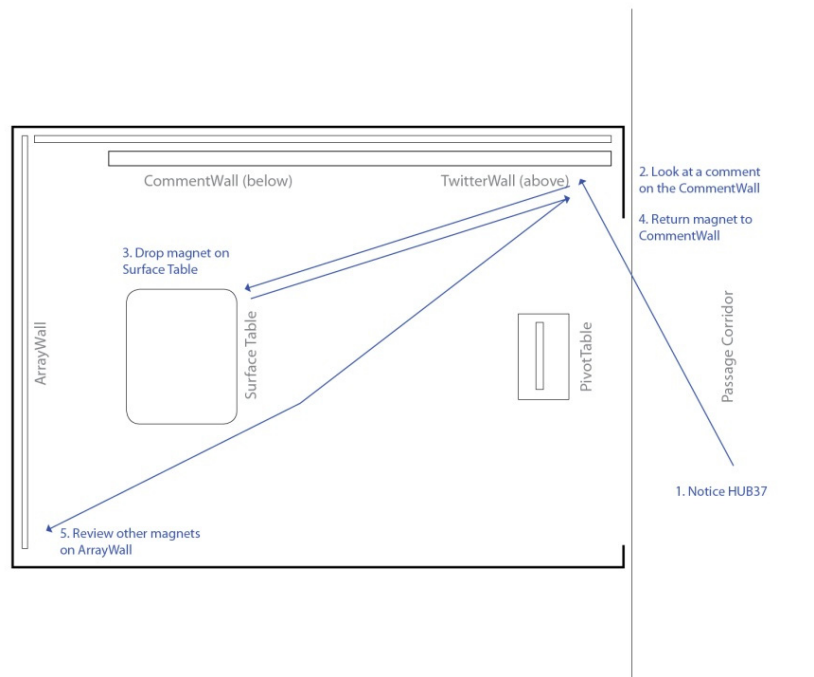


Figure 6.17 A second potential trajectory for users entering Hub37

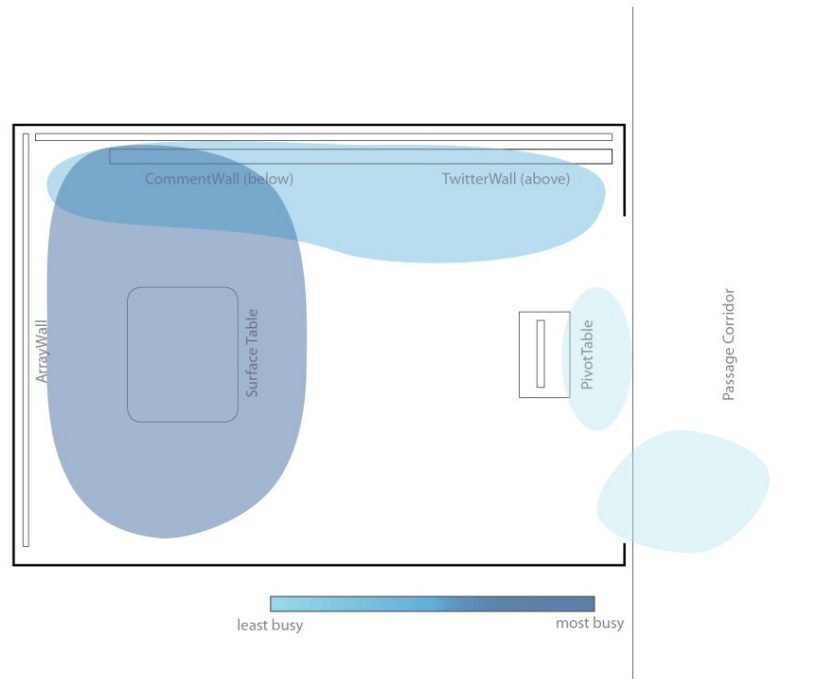


Figure 6.18 Spaces that tended to be most busy in terms of usage

In terms of behaviour, times of the day played an important role in the choice to interact with the installation. Since the Hub was located in a transition corridor between the entrances of two major EL (Chicago subway) lines, there was a steady flow of traffic in front of the installations. In the mornings when people were passing by to get to work, very little activity happened at the installation. Activity picked up when people returned from work or in the middle of the day when people were merely strolling around. One of the inferences that can be made from such a behaviour is that in addition to context and environment, *situational intent* of users is an important factor for designers to consider. Situational intent is an important insight from this study and has been explored in detail later in the chapter.

Technology within Hub7 acted as attractors for people to enter into the space and play with them. However they also played another important role in ALO – they were conversation

starters. People at the Surface Table would peek at magnets that other people brought to the table and start talking to them about the piece. These conversations would range from their specific thoughts about the piece, to where it was located, why it was important, to general discussions about the artist, about the style of art, and in general their points of view about an event like ALO. Art that received the maximum number of conversations on the CommentWall were ones that were advertised or pushed by artists themselves. Very often many of these artists would linger around in Hub37, waiting to see if anyone peeled off their artwork's magnet. Once they saw someone playing with their magnet, these artists would stroll over and start a conversation with that person or group. These observations signify that technologies in public spaces could act as catalysts for conversations more than replace these conversations altogether. Taking this approach might differentiate the way a designer designs, implements, and evaluates interactive public installations in urban spaces.



Figure 6.19 Conversations at the Surface Table about art, often with the artists themselves

6.5.2 Content generation

The CommentWall and TwitterWall offered opportunities for asynchronous conversations similar in nature to the ones happening around the Surface table. The CommentWall was initially designed to accommodate low-tech users who might not engage with the other high-tech installations in Hub37. Once the event started, it became clear that the CommentWall was one of the most popular parts of the Hub37 experience for all users, irrespective of whether they were low-tech and high-tech. Comments on the CommentWall ranged from opinions about the piece to where the piece could potentially be located once ALO was over. People wrote sentences, made sketches, drew graffiti, and made elaborate artistic renderings. Sometimes users build a comment around a particular magnet, sometimes they connected their comments to other users' comments. Chain of comments by different users responding to each other were also observed, in line with similar observations made at the Post-it Note installation.

One of the most common uses of the CommentWall was for artists to talk about their art, and to announce events associated with the pieces. Sometimes these announcements would also get picked up by the general public and commented upon. The following figures show the range of comments generated at the CommentWall. Some comments seemed to attract responses and comments just in the matter of a few days, while others took longer time. Note also how comments were mostly benign in nature; vandalism was not a major factor, probably because the installation was located in a major city centre. A few however were politically charged and had to be erased, but according to the CLA, these were few and far between.





Figure 6.20 Examples of comments collected over time on the CommentWall. The form of these comments ranged from simple sentences, to elaborate renderings.

Ownership of content played a large role in Hub37. Users seldom changed the position of a magnet, nor did they erase, change, or graffiti over another comment thread on the CommentWall. However it was interesting to note that because the magnets were the primary source of information for the art pieces, users were temporarily willing to peel off magnets that other users had used for comments on the CommentWall. However they returned the magnet to (more or less) the same place on the CommentWall after their “total” interaction with the magnet was over. By this is meant that users might take the magnet from the CommentWall, play with it for a while on the Surface table, take it to the ArrayWall to compare it to other pieces, talk about it with other people in the space, and only when they completed all the activities they wanted to do with the magnet, did they return it to its original place. If they wanted to make a comment on the piece, they would navigate around existing comments. This behaviour was consistently observed in the Hub. It can be inferred that while

users respect ownership in the installation, temporary suspension of this respect is acceptable. The fact that they returned the magnets to the same place suggests that users were careful to remember the location of the magnet and retain this information even while they used the magnet for their own purposes. Returning the magnet to the same place conforms to insights regarding ownership of content seen in the Post-it Note study - while a temporary suspension is acceptable, the long term flow of asynchronous conversations must continue in public creative installations.

The TwitterWall in its core functionality was simply a tweet aggregator; however went much beyond that in reality. The TwitterWall aggregated all tweets made to the #ALO and #artloopopen hashtags and presented them on a large horizontal display in the Hub37 space. The algorithm measured each tweet - looking for number of characters, positive or negative nature of the tweet, number of followers of the person tweeting, and other such factors. A new artwork was created using tweets every day. Since ALO was primarily an art exhibition, TwitterWall was particularly contextual and in the spirit of the experience invited users to create art as a community. The TwitterWall was designed to extend the ALO experience beyond the physical location of the Hub. This feature was seen as particularly important as users could contribute ALO without being physically present. The non-located aspect of TwitterWall was designed to allow people to come to the Hub once, participate in the experience physically, and then continue the interaction while on the move (on a train, or at work). During intercept interviews, people indicated that they valued the ability for them to interact digitally from anywhere. Using a popular platform such as Twitter allowed them already on the platform to participate without additional login and registration hassles. However the TwitterWall was only moderately successful - most of the tweets posted were advertisements for ALO from Chicago Loop Alliance or Chicago Artists Coalition. In comparison to the CommentWall, the comments posted to Twitter were practically insignificant, averaging

only around 200 tweets per week. Perhaps the immediacy of the CommentWall was one of the reasons why it was more successful. The TwitterWall did not provide this immediacy and one of the considerations for design is how to build this into the extended experience of an interactive public installation.

6.6 Key insights from the Study

The Art Loop Open provided an interesting opportunity to study user behaviour in a large public installation in the wild. The observations made at the installation led to the following key insights:

6.6.1 Situational intent

During the fly-on-the-wall observations as well as short intercept interviews with users, it was clear that users of the Hub arrived there with different initial intentions. Artists for example came to the Hub with the intention of "selling" their art and persuading users to visit their art. Visitors to the exhibition entered the Hub with the knowledge that the Hub would provide them with information about the exhibition and specific pieces of art. Visitors and shoppers in the Block37 mall would wander into the Hub curious to see what the space was about. Once they were in the space, they would engage with the installations, and sometimes go over to the venues see the art work. Transient visitors, often office workers, would ignore the space in the morning hours when they were rushing to get to their offices. The stop motion snapshots showed many more users strolling in during the evening hours while moving along the transit corridor. This behavioural effect, is noteworthy since it shows that users entering into a specific context will have a specific initial intent. This effect is henceforth referred to as *situational intent*. Situational intent is constructed by the user as a combination of environmental context (what the environment provides in terms of cues, signals, and messages) and user context (information that the user brings to the interaction). Situational

intent is constructed because of user's specific situation at a specific point of time but can change over the period of time during which a user is embedded the situation. For example, a person going towards his/her office stepping out of a subway train into a transitional space has the intention of rushing through the space to get to the office and does so. The same person in the evening might have the intention to returning back into the subway train but may choose to stroll through an interactive installation on the way. Understanding situational intent of users becomes a crucial factor for the design of interactive public installations. Furthermore, two people inhabiting the same space may have two different intention based on their situation. A museum visitor walking into a museum walks in has an intention of exploring the exhibits, while a museum guard walking into the same museum walks in with the intention of work. The propensity of these users to interact with a particular installation will also be different. Thus it can be claimed that it is situational intent which determines the behaviour of users as they enter into an interaction and their propensity for engagement.

6.6.2 Asynchronous conversations and ownership of content

The Hub37 installation at the Art Loop Open showed how a public creative installation is as much about asynchronous conversations between users as it is about synchronous conversations. At the ArrayWall and the Surface Tables for instance, users could pick up art pieces and converse about them in real time. When they saw an interest in their piece, artists could walk up and talk to visitors about their interest. But this demanded that they be in place at that specific time. If they were not in place the opportunity for conversation would be missed. The CommentWall and the TwitterWall, on the other hand allowed for asynchronous conversations. Artists and users could walk up the CommentWall, pick up a marker, and leave notes, sketches, or comments on the wall without any specific user in time. The same was possible with the TwitterWall. The important difference here is that they did not have to be in place for this conversation to be picked up by other users. Both of these installations allowed

users to enable in conversations over long periods of time – one comment could be written in the morning, a response in the afternoon, another response two days out, and so on.

A related and important insight from the ALO study is that users enable asynchronous conversations to permeate over time by respecting ownership of content. Users seldom disturbed the location of a magnet and the content generated by another user. They would always respond to it by writing around it or start a new conversation altogether. Temporary suspensions are acceptable as seen at the CommentWall where users would peel off a magnet for temporary use but return it to the same location so that the comment chain was not disturbed.

Both of these are important insights as they are starting to describe the mechanics of a public creative installation. It can thus be inferred that a public creative installation is one in which asynchronous non-located conversations are possible between users.

6.6.3 Back end experiences must be as good as front end experiences

At the end of the Art Loop Open event, it emerged that two organizing entities, Chicago Loop Alliance and Chicago Artist Coalition were interested in the asynchronous conversations generated at the CommentWall and the TwitterWall. They used the information to sense the mood of audience participation at the event and react with activities, programming, and marketing. As described in Chapter 1, the appeal of public creative installations comes from the fact that urban agencies can use these systems not only to present engaging placemaking experiences to the urban citizenry, but also use them as conduits of information transfer. The creative output of urban citizens in this case provided important insights into behaviour, choices, and opinions – essentially a snapshot of the public at that point in time, in context. At ALO for example, the CommentWall, TwitterWall, and the engagement at the Surface Tables were became ways in which the sponsoring organisations Chicago Loop Alliance, and Chicago

Artists Coalition “listened” to their audience. CLA took photographs of the CommentWall every day to record the conversations. The Twitter feed was posted to the ALO website every day and at the end of the event passed on to CLA for evaluation. The CLA representative at Hub37 was advised to monitor conversations at the Surface Table about the art pieces.

While these ad hoc mechanisms worked in the context of Hub37, it also signals that more thought should be put into the design of such back end systems. For a designer of a public creative installation, the total user base consists of both the platform open to urban citizens to interact with the installation, but also the backend architecture which enables agencies to understand and keep track of what this engagement looks like. Total user experience in this case, must be a composite of the front end experience, the user interface of the installation as seen by the public on the street, as well as the back end experience, the technology and architecture for tracking and aggregating the creativity of the urban citizenry.

6.7 Discussion

Art Loop Open provided a unique opportunity to test the frameworks developed so far. The fact that it was set in a large public context with a large population of users, meant that it is perhaps the most important study in this thesis. The opportunities it provided were based on:

- 1) The nature of the implementation: This was an installation implemented for a real event, not a controlled research study. And so all the lessons so far had to be synthesized and the frameworks used for the design and deployment of the experience in the timeframe of the project.
- 2) The scale of the implementation: The installation was built for a public event visited by 1000’s visitors every day. All the technologies had to accommodate this level of anticipated usage during the two week period the installation was up. This level of

usage also provided ample opportunity to observe and record behaviours over a large number of users and long period of time.

Aside from the opportunity that Art Loop Open provided to test the framework in a real world settings with a large population, it also provided some important insights into interactivity in public creative installations. The nature of the content that was generated at the CommentWall showed that such installations allowed for creative expressions by the users, but also at the same time provide opportunities for asynchronous conversations where these users do not have to be located temporally or spatially close to each other. We are used to such conversations in our everyday lives – letters, emails, blog posts all allow for such conversations to take place. Yet in public interaction, such interactions are seldom explored. This presents an opportunity for designers to design and develop installations that allow for such conversations to happen in public spaces. When such installations are designed it also presents another opportunity – designers as well as other interested agencies interested in these conversations can monitor the conversations, watch what happens, and thus build on the experiences.

But what is the difference between an installation that allows for public creativity and one that does not? In a traditional interactive public installation, the entire user experience must be designed by the designer. This means the designer must build both the technology platform with which the user will interact *as well as* the content that the user will interact with. On the other hand, the content of a public creative installation is created by users over a period of time. In this manner, public creative installations allow for temporally extended experiences to be generated by users in collaboration with other users. In this case the designer does need to worry about content as long as it is defined within a prescribed trajectory of use. The designer

need only design and implement the technology platform upon which such experiences can be constructed by users.

The framework that led into this project is limited in its construct and does not account for some very important aspects of user behaviour in public spaces as seen in this study. A need for revision of the framework was recognized at the end of ALO. An opportunity for such an evolution was presented when I had the opportunity to use these frameworks in a graduate design workshop at the IIT Institute of Design. The purpose of the workshop was originally to test if the frameworks used for the design of an experience like ALO can also be used by other designers to develop different experiences. The workshop occurred simultaneously with the ALO project. The result of the workshop led to 3 installed interactive projects on Chicago's State Street. However this project is key because I was able to introduce the framework to graduate students of design, who used the framework very differently to build their installations. Feedback provided by students in the workshop, and semi-structured interviews with nine students involved in the workshop presented some surprising insights which in tandem with the insights from the ALO study helped to reframe the framework in a completely different manner. The graduate design workshop and the study with the students is the focus of the following chapter, the evolution of the framework based on the insights from these studies is the focus of Chapter 8.

Chapter 7. State Street Projects

So far the thesis describes the importance of placemaking in urban design, the need for a framework for interactive placemaking, and the formulation of such a framework from existing literature in HCI and design. This framework is then used to evaluate two case studies, as well as design and implement a controlled prototype for testing out public creativity. The previous chapter describes a large scale public exhibition called Art Loop Open which provided an opportunity to use the framework to design and evaluate a large scale in the wild. The project was implemented in a major transit center in Chicago, and was used by 1000's of users every day for a period of 14 days. The scale of the ALO project helped highlight some key insights. The study highlighted the importance of public creative installations as promoters of asynchronous conversations between urban citizens as well as how these conversations could be used by sponsoring agency as a way to understand its user base. One particularly important insight was that the PIE framework may be inadequate to describe the complexities associated with the generation and evaluation of large scale public creative installations. This means that a new framework needs to be considered or a rebuild of the original framework may be required.

Around the same time that design for Art Loop Open was taking place, one of the organisations sponsoring the exhibition, Chicago Loop Alliance approached IIT Institute of Design to engage with ID students in a class project. In particular, based on the success of Art Loop Open, the organisation was interested in exploring the idea of using public installations for engaging audiences on the street. As a business organisation, they are constantly trying to understand the core demography of their district, and they wanted to explore interactive placemaking as a way to get to this information. A student project presented a unique opportunity to take a considerably different direction from the research so far. It would enable

me to present the framework to *other* designers and see how they appropriate it to generate new interactive public installations. As will be seen later in the chapter, this differentiated approach provided an important direction to rebuild the PIE framework from a designer’s point of view. The simultaneity of the ALO project and this class meant that frameworks in Chapter 6 could be extended in two different ways.

7.1.1 Evaluating the PIE framework in two different ways

The design phase for Art Loop Open was completed in July 2010; this is when CLA approached IIT Institute of Design to discuss the possibility of working with students. The implementation phase of ALO started in August 2010. The class, whose primary goal was to design working public installations at four chosen locations on Chicago’s State Street, started in August, and ended in December of 2010. The installations were deployed in December and stayed up through February 2011. As can be seen from these dates, both the ALO project and the class ran almost simultaneously. This simultaneity meant that the PIE framework could be evaluated in two different ways at the same time. While ALO explored how the framework could be used to design and evaluate a large scale prototype in the wild, the student State Street projects became critical enquiries of how *other* designers might appropriate the framework to design such installations.

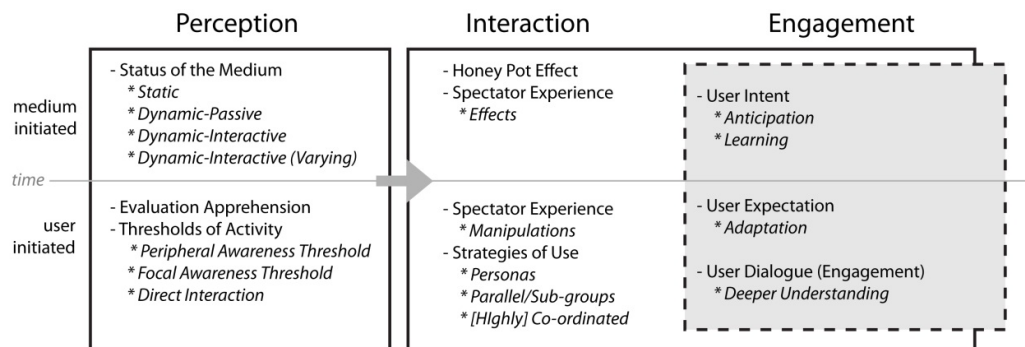


Figure 7.1 The extended PIE framework

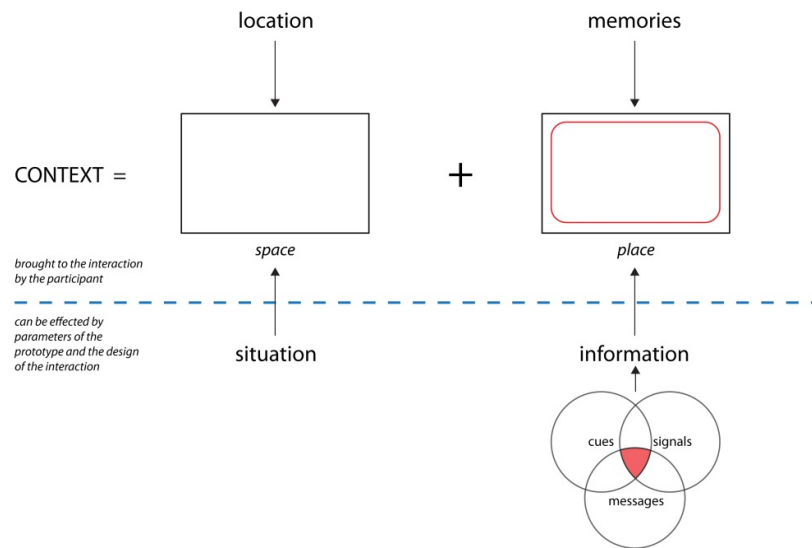


Figure 7.2 Context augmentation to the PIE framework

Students were encouraged to employ the frameworks (PIE and context augmentation as seen in Figure 7.1 and Figure 2.2) as the basis for research, design, deployment, and evaluation of the installations. The frameworks were presented as content of class lectures; the lectures were followed by discussions about the frameworks, their validity in the scheme of the workshop, and how students might employ them. Lectures were presented early in the semester, where students could engage them within the teams and talk about the appropriateness for their specific project. Since the purpose of the study was to observe how designers employed the frameworks, students were encouraged to evolve and adapt the PIE framework to their own needs and requirements if it did not fit with their specific trajectory.

To differentiate the State Street project from ALO, significantly different questions were asked of the study:

- 1) Will designers (in this case graduate students at the Institute of Design) appropriate the framework to develop real world solutions? How will they use the framework for generation and evaluation of interactive public installations?
- 2) Can the student projects be used as critical enquiries in to the use of interactive public installations in a high visibility real world situation such as the Chicago Loop?

In order to seek answers to these questions from the students in the class, it was important to have an implementable project specification. Before the class started, the Chicago Loop Alliance worked with me to develop a comprehensive specification asking students to build interactive public installations at four locations on the historic State Street in Chicago. The Chicago Loop Alliance saw these projects as prototypes to explore new ways of communicating with its demography on the street. They also wanted to see how weaving technology into physical infrastructure, *vis-à-vis interactive placemaking*, could create a better ambiance for the people on the front end and enable them to learn about their patrons on the back end.

7.1.2 The spec from Chicago Loop Alliance

When Chicago Loop Alliance presented the brief for the class project they described the Loop as a place which can be deconstructed into a complex array of historic artefacts, personal memories, political engagements, endeavors that succeed, and those that fail. This immensely rich environment provides a wonderful context for technological experimentation. CLA suggested four locations along State Street that students could use for such experimentation:

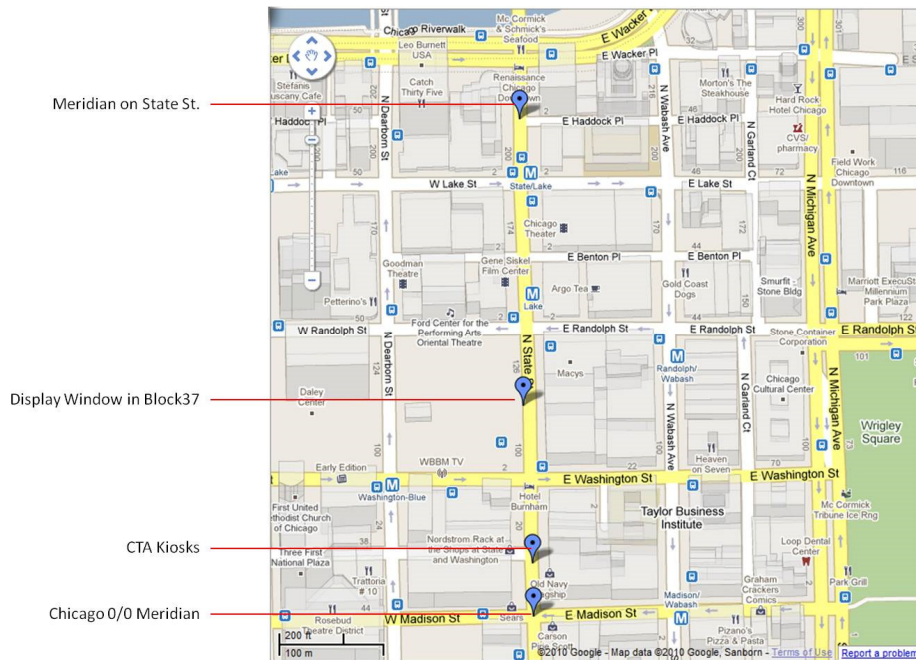


Figure 7.3 The four loop locations assigned to the teams by Chicago Loop Alliance

The four locations (as shown in Figure 7.3) are:

- 1) The Median at the entrance to State Street from Wacker Drive which forms the northern “gateway” to State Street. The median is relatively uninhabited at most times of the day. Two major resources, the Wit Hotel and the Renaissance Hotel were identified by CLA as potential partners in the installation. Installation 1: WishState was installed at this location.
- 2) Window in Block37, a beautifully designed urban mall on State Street. The window site in Block37 was the most restrictive in terms of space, but also enabled a large surface for touch or gestural interaction. This site was supported by Block37. Installation 2: Urban Forest37 was installed at this location.
- 3) Two CTA kiosks between Washington and Madison, once access points for the Chicago subway but no longer functional, were made available by the Chicago Transit Authority

for the project. This site was supported by CTA, and the Department of Transportation (DoT). An Urban Harp installation was planned and prototyped for this site. However this installation was never installed and is not covered in this study.

- 4) Intersection of State and Madison, which forms the starting point for Chicago's street addressing scheme, i.e. 0 NS and 0 EW. The intersection was once famous as the world's busiest intersection. CLA identified the intersection as a potential installation site. This was tough site because there was no space associated with the site, only an intersection. However buildings and landscape furniture on all four corners was made available to the team. Installation 3: ZeroZero was installed at this location.

7.2 The Communication Design Workshop

The class started in August 2010 and was designated as a Communication Design Workshop. 20 postgraduate students enrolled in the class; 50% with a prior design degree, and 50% without any design experience. Communication Design Workshops are 16-week long studio classes where students are exposed to new developments in communication theory and asked to employ these methods, tools, and technologies in real-world applications and/or projects. Many of the projects are sponsored by organisations and companies and students are expected to employ theory in communication and interaction design to develop new concepts and installations in an area defined by the sponsoring organisation. The class was oversubscribed⁹ and showed the student interest in this topic space. The class met once a week for 4 hours. This session at the beginning of the class was composed of an hour lecture, followed by three-hour work sessions. This structure changed in the later parts of the semester

⁹ The class is normally limited to 20 students, however more than 25 students showed interest in the class and registered for it. 20 students who took the class were selected on a first come, first serve basis.

and became four-hour work sessions. Given that these projects would ultimately be installed on site, the latter work sessions were used to discuss design and implementation issues related to the project. Students were also expected to spend between four to eight hours working on their projects outside of class.

The 20 students enrolled for the class were divided into four multi-disciplinary teams of 5 members each. The teams were each assigned one of the CLA locations on State Street. Teams were particularly important in this class because of the scale of the project – the teams had to take a design idea from concept to implementation within the 16 week time frame of the class. Each team had a spatial designer, an interaction designer, a graphic designer, an engineer, and a user researcher. This multi-disciplinary approach was chosen specifically to encourage students to think of the project from multiple points of view. Each team was asked to come up with an idea for a public creative installation, test it, and implement it. The questions presented to the students at the beginning of the workshop were:

- 1) how and why people "engage" with other people at public spaces?
- 2) what happens when we embed technology (mobile, large display, ubiquitous computing) into the street and allow passers-by to engage with other citizens?
- 3) can CLA over time employ such technology installations as catalysts for user inquiry?

7.2.1 Engaging designers and learning from them

The primary reason for such an engagement with students was to test the validity and adaptability of the frameworks with actual designers in an actual design environment. While students cannot be counted as actual designers, all of them indicated that they are interesting in design positions upon graduation. Eventually all the students moved into design and technology practice (see Table 7.2). Furthermore, students in classes were encouraged to

follow a process for the design and implementation of their installations. Based on this, it was assumed at this point that the manner in which the students employ the frameworks in the design process will be a good signifier of designer preferences. The students were exposed to the frameworks early on in the process but it was not stipulated as a requirement that they should use the frameworks. As the faculty member teaching the class, I also engaged in constant observation and periodic discussions with the students. This helped in understanding how the frameworks were employed in the process of design, if at all.

Since this was a studio style class, the teams met twice a week to discuss their design ideas with their teammates, eventually these ideas became low fidelity prototypes, medium fidelity prototypes, and took on the shape of the high fidelity prototypes that were installed on State Street. Students were graded on the quality of their final installation as well as the process they followed to get to that point. As is common with these classes, faculty members engage with the students in critique sessions every week. The critique sessions help monitor the progress of the teams through active discussion about what they have done, how they did it, and what they can do moving forward. Such critique sessions help teams to reflect on what they have done and develop strategies for what they might do next. In this research, the critique sessions also qualified as observation sessions during which the use of the framework and its components (if at all) were observed and recorded.

The following are short descriptions of the three installations studied as part of this project. It is important to note that the descriptions are only provided as a means to understand the output from the class. Each section highlights how each team employed the framework, which will eventually be explored in greater detail later in the chapter:

Installation 1: WishState

WishState was installed in the first location at the Median between State Street and Wacker Street. This team asked the question - how technology help in aggregating intangible artefacts and emotions of an urban experience? WishState was an augmented reality installation where users could plot wishes for the season in a specific location in the Loop. The project took on specific meaning because of the time at which it was installed – the December timeframe, when urbanites were preparing for the holidays and the New Year. This provided the perfect platform to see how intangible artefacts like wishes can be projected and plotted on place.

This team employed the framework sparingly through the design process. Elements of the framework such as evaluation apprehension, thresholds of activity, and honey pot effect were used by the team during brainstorming sessions to develop ways in which users might approach their installation. However during concept development and evaluation, the PIE framework was not used at all. Two members of this team were interviewed (described in Section 7.4) and describe how they used other familiar frameworks such as the 5 E's (Conifer-Research 2004) and AEIOU (Kumar 2012), but did not find the PIE framework useful for the development of their design. During the card sort however, these students point to specific components such as cues, messages, and signals, which they found useful for discussion about what goes into such installations.

Users arriving at the median on State Street were greeted by ribbons which suggest that something new is happening at the median. Once inside one of these “ribbon spaces” instructions tell users how to use their mobile devices to leave a wish on the street using the Layar AR application. The wish itself is placed at the median (geo tagged for that location), even if only virtually. After leaving a wish, users can use the Layar app on their smartphones or tablets to see all of the other wishes people have left. At this point, users might choose to

"like" someone else's wish. In addition to an X and Y co-ordinate, the virtual wishes are "buoyant" rising in Z space with every "like" it receives. When wishes reach 10 "likes" they are set free, and are no longer visible on the AR viewport of Layar. The wishes as they are posted were also visualized as a feed on the window of the Wit hotel next to the median.

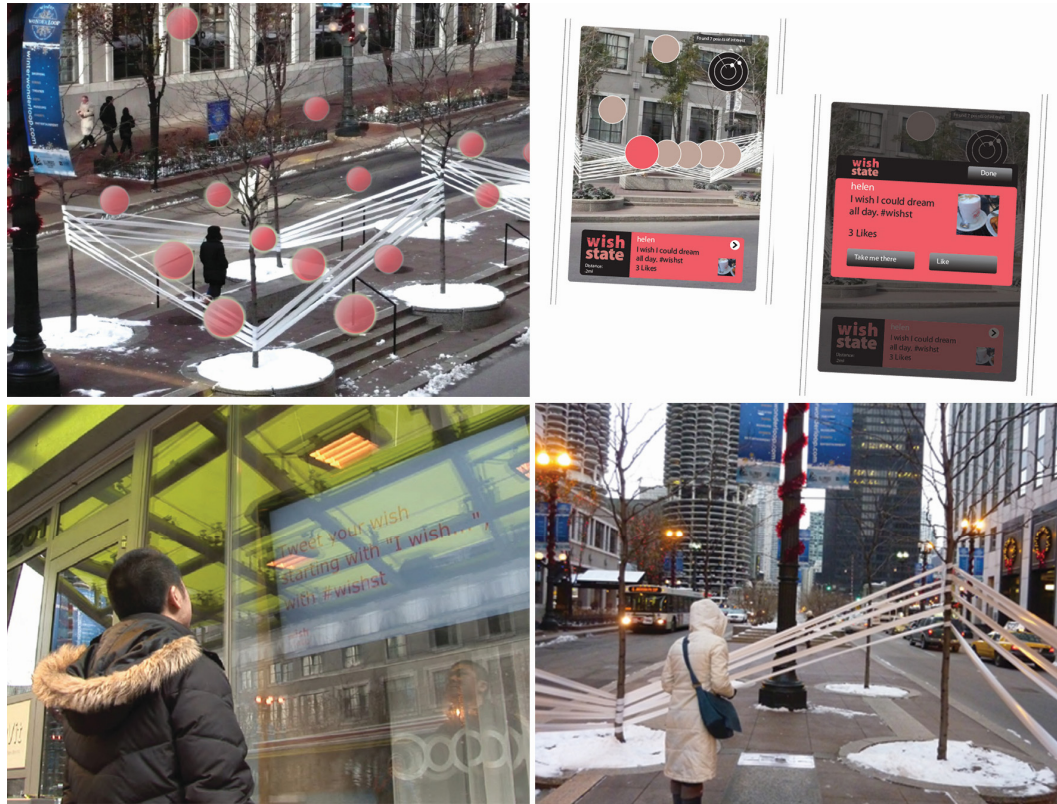


Figure 7.4 Wishstate installation showing the physical installations and the augmented reality implementation on mobile

Using information from the installation, students were able to provide the Chicago Loop Alliance with information about what people were thinking. In addition by enabling the provision to like or dislike wishes, it was also possible to track what people thought about other people's wishes. While the conceptual premise and the technological implementation of this project were strong, the actual response to the project was weak. Very few wishes were

registered. In retrospect, three problems were identified as the reason for this lackluster response:

- 1) Augmented Reality is not prevalent enough for people to engage at a mass scale.

While AR exists as an exotic extension of some commonly used apps (like Yelp), Layar is not a commonly used application. To engage with the installation, users had to take the extra step to download this app and use AR.

- 2) The installation was a pure AR implementation. The only physical indication of the installation was in the form of ribbons wrapped around trees and a Twitter feed in the window of the Wit hotel. While initially the idea was that this would drive traffic to the median, these physical installations proved to be inadequate. In order to engage with the installation, users would have to walk over to the media, read the instructions, pull out their smartphones or tablets, and play with the information.

- 3) It was winter. In Chicago, it is cold and windy during winter. Pulling a smartphone out and playing with it during the winter months can be quite a daunting task.

In spite of these problems, the project itself was appreciated as conceptually clear and technologically forward looking. Even though the framework was not used, some parts of the interaction model became the basis for discussion and evaluation. The next team working on Installation 2 showed that the components of the framework are useful for generation of new concepts as well, especially as mechanisms for the development of prototypes.

Installation 2: UrbanForest37

Urban Forest37 embeds the concept of a social family tree into two windows of a large urban shopping mall called Block37. The location Block37 has a storied history – it is famous for being perhaps the most prominent vacant lot in the country (Sharoff 2007), having remained vacant

for over 20 years. When the sleek steel and glass urban mall, designed by the architecture firm Gensler, was finally constructed in 2007, it saw itself caught in the growing woes of the recession and the overall decline of large urban shopping centers - several of its high profile clientele leave and a superstation for an express route to the Chicago O'Hare airport disappeared because of lack of funding. This team worked on the premise that everyone is inter-connected in the city, often through relationships forged by an engagement with the city, sometimes in far greater ways than what is visible. Urban Forest³⁷ is an interactive installation that attempts to highlight these relationships by making them visible – at the street level.

The team used the PIE framework by breaking it up into its component features. During class discussions, the team identified progression of Perception-Interaction-Engagement along the thresholds of activity framework as the single most significant aspect of the framework useful to them. As part of the process, this team collected several urban installations as precedent studies, and then mapped all of these installations along the thresholds of activity framework. The team understood that the installation was part of a mall window display and understanding how users' transition along the thresholds of activity will be very important for design. During the design phase, the context augmentation framework and especially the concept of Cues, Messages, and Signals played a large role in this team's process. The team specifically deconstructed components of their installation into Cues, Messages, and Signals and built different prototypical scenarios of use to explore ideas. Two of the team members interviewed (described in Section 7.4) suggested that these scenarios helped the team ask specific questions about the fidelity at which information should be presented at the installation.

The final installation was identified by the Chicago Loop Alliance as the simplest and the most successful of all three installed projects. The installation uses the two display windows to ask

passers-by to answer one of two questions – Thin Crust or Deep Dish? Sox or Cubs? O’Hare or Midway? The questions were designed to change out every 72 hours. The interaction model is simple – as you walk down the street you tap on the question you associate with. The tap is visualized as a leaf on a digital tree that grows with every answer. As more people answer the tree grows larger and larger – and the visualization allows passers-by to see which question is getting more responses from people on the street. So if you are passionate about Deep Dish pizza and you see that Thin Crust is winning, you can choose to add to the Deep Dish side. The one step interaction model used (touch the question you want to answer) comes from embedded user research which suggested that passers-by like to note their preferences without hassles of log in or connecting using other mediated interfaces. This meant that passers-by were free to interact with the installation anywhere along the thresholds of activity framework (Brignull and Rogers 2003) – through peripheral awareness as they walked across the installation; through focal awareness as they watch others interact with the installation; or through direct interaction as they add their response to the “forest”.



Figure 7.5 Urban Forest37 showing the simple touch interaction and the visualisation of the trees and the urban forest

When installed on State Street, the numbers of responses for each question were tracked for two purposes – first to render past responses in the background as a “forest” constructed over time representing the collective preferences of a city; the second to construct a demographic profile of the population which frequents the urban location of Block37 on State Street (and the Loop). The second purpose for tracking is important as both Block37 and the Chicago Loop Alliance, the sponsoring organisations, were interested in increasing foot traffic in that area. The business premise was that understanding the demographic profile of the pedestrians on the street will allow both organisations to build experiences that can be catered to specific populations. This aspect of the project played a large role in the framing of the questions since aggregated responses to even a seemingly benign question such as “O’Hare or Midway?”

(names of Chicago airports located at two ends of the city) could potentially lead to an understanding of where the respondents live in the city.

The fact that this team used components of the PIE framework for prototyping suggests that the framework can be used as a generative mechanism. Since the structure was ignored by team, it raises the question – is a new structure required that allows easy appropriation by designers? The third team working on Installation 3 provided a potential direction for a new framework structure.

Installation 3: ZeroZero

The intersection of State and Madison is the center of the addressing scheme for the city of Chicago and has been so since 1909 when this new system was implemented. The addressing scheme uses a grid system with has a 'primary' street at each half mile, and eight city blocks measure one mile and marked in increments of 100 from the origin of the grid at State (0 East) and Madison (0 North). Thus, one can easily see that Michigan Ave (100 East) is one block east of State St and Congress Parkway (500 South) is 5 blocks south of Madison St. Equally important is the fact that one of Louis Sullivan's most recognized designs, the Sullivan Center (or the Carson Pirie Scott building), is located at the South East corner of this intersection.

For the team, the story of State and Madison became a story of re-centering. It was about re-centering around the city, its many neighborhoods, countless restaurants, bars, theatres and playgrounds all of which can be traced from the city at State and Madison. It was also a story of re-centering around the history of Chicago. State and Madison at one time used to be the busiest intersection in the world and even today has a large pedestrian traffic. The installation highlighted this by first giving State and Madison a personality – ZeroZero, and secondly by making visible the invisible stories of the countless people who pass along this intersection, a composite of the infinite number of place narratives that pass through the intersection.

The ZeroZero team was the only team to incorporate the PIE framework and the context augmentation from the very beginning of the design process. However soon they discovered that the PIE framework did not work for the specific requirements of *their* installation. The team's design process saw them first adopting the PIE framework, then learning its inadequacies, and eventually rebuilding it for their own project. Once rebuild, the basic structure *Perception-Interaction-Engagement* was retained only in principle; the primary critique being that this progression is presented from a users' point of view. The new framework changed this by mashing the PIE structure with Conifer's 5E's framework (Conifer-Research 2004) and the thresholds of activity, presenting a different progression based on how the installation presents itself to the user - *Art - Interaction - Information - Nostalgia*. Four members of this team were interviewed (described in Section 7.4), and all of them describe how this process of rebuilding the framework not helped them design the installation better but also gain deeper understanding of each component of the PIE framework.



Figure 7.6 ZeroZero showing its two embodiments - a physical installation in the Sullivan Center and an online installation at zerozerochi.com

The ZeroZero installation has two embodiments: a physical one and a virtual one. ZeroZero’s physical embodiment was designed into the corner windows of the Sullivan Center. The window installation consists of a sculpture, an iconic world map, and instructions on the

windows. ZeroZero's virtual manifestation¹⁰ consists of a website and a mobile page. At the website, one can read about the history of State and Madison, and contribute to the place by adding an address anywhere in the world and describing why it is important to him/her. For example, I could add my home address and describe it as where I live; or add a University address and describe it as where I went to school; and so on. The website then uses a Google Maps API to pull an image from the address entered and add it to a database. The visualization pulls all of these images to show the many different stories of people who have interacted with ZeroZero – not just location, but also the place narratives. The system also translates the number of miles into a cumulative total represented in terms of number of Chicago blocks traveled (based on the fact that 1 Chicago block = 8 miles).

Since ZeroZero had to sit in one of the busiest intersections in Chicago, it was designed in four levels – at its base level the installation can be enjoyed as *Art* (the sculpture and the map located in the Sullivan Center). If someone was interested, they could move into *Interaction* (the instructions on the window describes why State and Madison is important). If they are further intrigued, they can get more *Information* from ZeroZero (through their smartphones or tablets on the website). And finally if ZeroZero plays a meaningful role in their experience, they can extend their *Nostalgia* with the place (by adding their own place narratives and sharing it with others). ZeroZero's front end experience showed that people were willing to add their place narratives – in the end 2344979 blocks were traveled. But its integrative power comes from its back end tracking. By tracking place information, CLA was able to track where people on State Street were coming from – not just through quantitative metrics (which students were able to derive from Google Maps) but also through qualitative metrics (through the

¹⁰ At www.zerozerochi.com. The website is no longer in service.

descriptions that they add to the story they share). Moreover, no identifying information was asked for, no login was required, no names or identification data had to be provided during the interaction. Any information provided was purely voluntary and with the knowledge that it would be shared among others visiting the interface. This meant that CLA could take the data and use it both at a macro aggregate level (were the users primarily tourists or residents?) or at a micro specific level (what makes certain places valuable for people?).

So far, the framework was structured around how a user might approach a public installation; reframing this to how an installation presents itself to a user is probably a much more appropriate direction for design generation and evaluation. Observing the ZeroZero team as they moved through this process of redefining the framework suggested that a similar process could be used for the rebuilding of the framework.

Observation of students as they worked through their process was by itself was not adequate to make critical judgments about the framework and its validity for other designers. It was also necessary to ask specific questions to the designers to find out what worked and what did not. The following section lists out the three different evaluation methodologies employed in this research.

7.3 Evaluation Methodology

7.3.1 Observations

During the semester, the primary source of feedback was through direct observation of designers and design teams as they moved through the design process. If and how the teams employed the frameworks was the first line of observation. If they did not engage the frameworks, what alternatives they used was the next line of observation. Based on the observations made during the semester a semi-structured verbal interview was designed. This interview was conducted at the end of the semester.

7.3.2 Verbal Interview

After the semester, nine students were selected to represent each of the four teams. These nine students were engaged through a semi-structured interview process. The criteria used for the selection of the interview candidates was that they should have been active participants in their team during the course of the semester. The make-up of the interviewees echoed the demographic make-up of the school, 4 out of the 9 students had prior design training, while the other 5 received their training at ID. Not all interviewees came to ID with a design background, and identified themselves both as designers and non-designers.

Following is a table describing the background of the students interviewed and where they are currently:

No.	Interviewee Name	Educational Background	Professional Experience	Qualify themselves as	Years of experience (before ID)	Years at ID	Currently working at
1	BS	Master of Architecture, Bachelor of Arts	Urban Designer, Architect	Designer	13	2	Seeking employment, has worked with Gensler, MSKCC
2	CC	Bachelor of Interior Architecture	Architect, Interior Designer	Designer	30	1	Gensler, teaches at School of the Art Institute
3	FT	Bachelor of Science	Information Designer, Architect, Industrial Designer	Designer	13	2	McDonalds
4	LA	Bachelor of Architecture	Architect	Designer	14	1	IDEO, teaches at School of the Art Institute
5	ED	Bachelor of Arts	Information Designer	Designer	12	3	As a design consultant, teaches at IIT Institute of Design
6	EL	Bachelor of Computer Science	Computer Scientist	Non-Designer	6	3	Ricoh Innovations
7	HT	Bachelor of Science	Human Factors Engineer	Non-Designer	5	3	S.C.Johnson
8	JS	Bachelor of Arts	Creative Writing	Non-Designer	5	3	Jump Associates
9	SW	Bachelor of Arts	Creative Writing	Non-Designer	3	3	Motorola Mobility

Table 7.1 List of the nine students interviewed detailing their backgrounds and where they work currently.

The interview was conducted in a semi structured format. The intention was to look at intrinsic motivations for the particular design choice; what went through the designers' mind when designing the installation; and how each student adopted the proposed framework, and/or developed new frameworks for design. In this regard, each participant was asked respond to questions around the following five themes¹¹:

- 1) Their personal description of the project.
- 2) The design process they followed.
- 3) How the team affected the trajectory of the design.
- 4) How the fact that they had to install in a public space affected the trajectory of the design.
- 5) And how they employed the framework.

Once the participants provided responses to each of the above themes, they were asked to participate in a card sorting exercise to discuss motivations and preferences of specific components of the framework.

7.3.3 Card Sorting Exercise

The card sort exercise which followed the verbal interview was modeled on traditional card sorting user study method. Card sorting methods are used by interaction designers as a way of understanding behavioural preferences of users. In most of these methods, index cards or Post-it notes are used to identify the different concepts, pathways, pages, or experiential units. The user group then arranges these "cards" to represent groups or structures they are

¹¹ A detailed version including questions around each theme is included in the Appendix.

familiar with. In this process users are encouraged to become “subject experts” and are guided to generate a category tree or folksonomy based on their preferences or prior knowledge. Nielsen suggests that while some forms of card sorting are evaluative in nature, most card sorting exercises are generative (Nielsen 2004). They are primarily used in the design information architecture, workflows, menu structure, or web site navigation paths; usually when there is no design yet, and the goal is to provide some direction for design based on what people think. Card sorting is a powerful method because it is inexpensive, low tech, and easily approachable (Spencer and Warfel 2004). While the construct of this particular card sort exercise followed the lines of traditional card sorting methods, the execution was slightly different.

The purpose of this card sort exercise was to provoke discussion about the different elements of the frameworks presented to the students. In other words, this card sort was seen more as a provocation for discussion than an evaluative or generative mechanism. To encourage a provocative discussion, each individual part of the framework was broken down into cards. These nineteen components were printed on cards that were given to the participants. The front of the cards had the name of the component, and the back had a brief description. All the cards were textual. No images or diagrams were used to explain the behaviours.

The cards were not sorted in any order or hierarchy. No suggestion of any framework was made either. Instead the cards were randomly placed in front of the participants. The participants were then encouraged to pick any card they wanted to talk about, discuss specific aspects of the card, how it influenced their design process, and what they felt the value of that card was within the broader scheme of designing interactive public installations. Participants were told that they did not have to pick all the cards, only the cards they felt merited

discussion. This was done specifically to see if there are aspects of the framework that were seen as important to the design process by the individual participants.

After talking about the cards, participants were encouraged to group the selected cards into preferred folksonomic categories. Participants were encouraged to create groups that they felt were important for the design of interactive public installations; groups and categories that would help other designers design such installations. No preset categories were given to the participants, and no prompts were made about the groups or the specific sub-categories the participants decided. The purpose of this part of the study was to see if the participants are able map these individual elements/units into combinatory groups, as well as to see what logic as used to develop such a structure.



Figure 7.7 Snapshots of four participants as they participate in the interview (on the left) and card sort exercise (on the right).

The different cards, each representing one component of the PIE framework and the context augmentation are listed below.

- 1) Perception
- 2) Interaction
- 3) Engagement

- 4) Status of the Medium
- 5) Evaluation Apprehension
- 6) Thresholds of Activity
- 7) Honey Pot Effect
- 8) Spectator Experience: Effects
- 9) Spectator Experience: Manipulations
- 10) Strategies of Use: Personas
- 11) Strategies of Use: Parallel/Subgroups
- 12) Strategies of Use: [Highly] Co-ordinated
- 13) User Intent
- 14) User Expectation
- 15) User Dialogue
- 16) Context
- 17) Cues
- 18) Signals
- 19) Messages

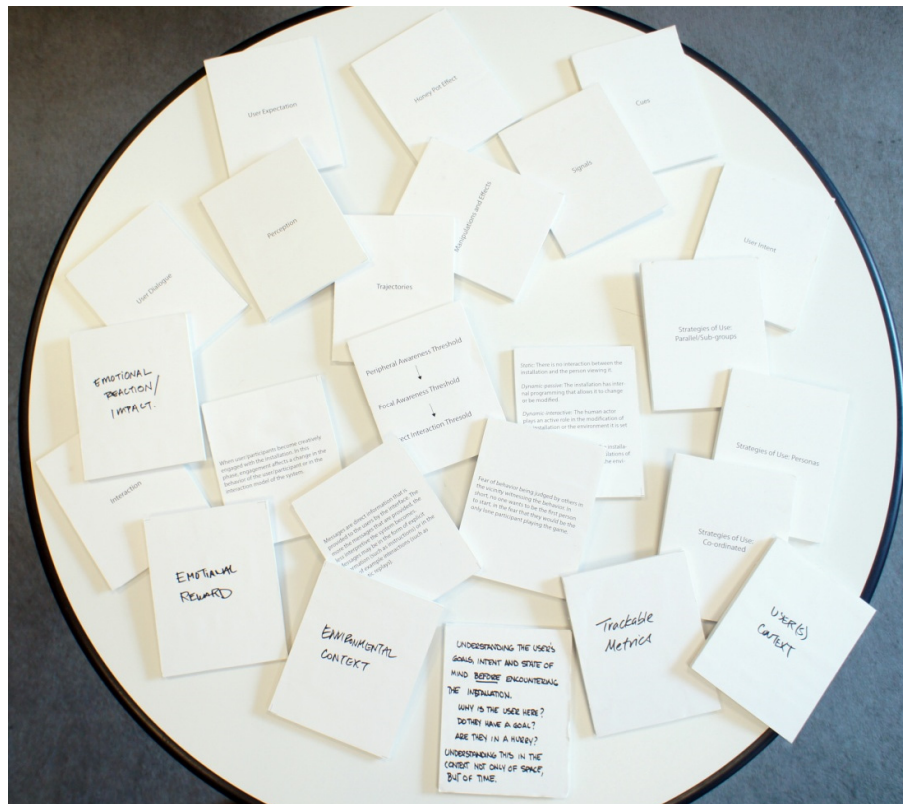


Figure 7.8 The cards used in the study laid out at the end of all the interviews. Note that some of them are printed while some of them are written. The printed cards were prepared for the interview while the written cards were constructed by participants during the interview.

Participants were also encouraged to create their own cards if they felt that the existing cards were lacking. To aid this, blank cards, and pens were made available to the participants. Once a card was created by the participant, the new card was added to the pack. The participants were encouraged to follow the same format as the printed cards – a name for the new component in the front, and a brief description at the back.

The following are cards that participants generated as they talked about their design process and what cards were missing.

- 1) Emotional Reward

- 2) Trackable metrics
- 3) User Context
- 4) Environmental Context
- 5) Situational Intent/Occasionalisation
- 6) Emotional Impact



Figure 7.9 User generated cards in contrast to the original cards

Clearly adding user generated cards to the pack changed the study as it progressed. The simple effect of this is that later participants had more cards to sort through than former participants. But it must also be noted that the purpose of the exercise was not to arrive at a statistical significant result; rather it was to see what reaction cards provoked within the participants. In this respect, it was important to observe if the user generated cards were appropriated by future participants in the discussion.

The first part of the study (observation) occurred throughout the semester. The second part of the study (interview and card sort) was conducted over a period of two weeks in the summer

following the semester. Each study lasted about 1 hour, interview lasting for about 30-45 minutes, and the card sort exercise for about 15-30 minutes. The sessions were video-taped and transcribed. No formal remuneration was given to any of the participants. Moreover even though the students were informed about the interview at the end of the workshop; the actual interviews were conducted in summer of 2011, after the students had completed the installation, and had a few weeks to reflect on the installation and the process. At this time all critique and grading for the class was complete. All association with the class, the client, and the specific project in question was complete by the time of the interviews. It was made clear to the participants that whether they did the interview, their responses, and the overall interaction did not affect their performance in the class. This ensured that grades, performance evaluations, and/or client interaction did not influence the responses of the students.

7.4 Findings

The responses from the participants in the interview and card sort exercise showed a variety of reactions to the framework and its components while the provocations led to discussions about what worked and what did not. Most importantly, these discussions pointed to what designers might look for while employing such frameworks in their design process.

Being a methods based school; ID students are taught frameworks in classes and how to employ frameworks in the design process. They are largely familiar with the use of frameworks in the design process and from the interviews, it was clear that the availability of the PIE framework and the concept augmentation was appreciated by all participants:

“[The frameworks were useful because they] became a consensus filter - same language and all talking about the same thing... [even though] people didn’t stick to the framework, we could always go back to the framework”

"...frameworks are really useful to work with a group, whether the group is the stakeholders, the actual project team... [frameworks are useful to] explain the process"

It is clear from these statements that the availability of the framework allowed the team to ground their process around one reference artefact. When the team diverted away from the directions proposed by the framework, the availability of the framework allowed them to go back and refer to the specific point from which they diverted. As seen in the following comments, the framework also became a useful stepping stone, highlighting next steps as the teams progressed in the design.

"The [PIE] framework helped us as a stepping stone to what we can do next...the framework became the scaffold that connected the high level story and the act of making it."

"[designers have a] tendency to go towards the complex...especially for interaction design - maybe because its digital, lots of possibility and you want to explore rich experiences you can get out of it but if people cannot follow along, it's completely useless. Our group [kept coming back to] your framework... [and] used some of parts of "your" framework in what we developed"

Clearly these quotes indicate that the students find frameworks useful in the process of design. It also confirms the proposal that designers will use such frameworks as scaffolding – to build consensus for an idea or construct new content on top of. It is interesting that some groups used the frameworks to ground their designs based on user experience – what the user receives from the experience. Others used the framework to reduce complexity. Many teams used the framework a mechanism to sort ideas – they would put up ideas on the whiteboard and sort them across the agreed upon components of the framework.

“...at each point, we would put a concept ideation process - put our ideas up on post-it notes on whiteboards and see commonalities. Then we would have to often step back - and talk about how these addressed the high level design principles.”

“[we wanted to] KISS¹² – ‘keep it simple stupid’...really difficult to keep in mind that people who would be interacting would have varying levels of sophistication with digital interaction”

The design teams were inter-disciplinary, which meant that many of the members brought in differing levels of knowledge of interaction design. The availability of the framework allowed the team to convene on one central idea and keep the idea simple in spite of the differing expertise of the teams. The framework also allowed the team to see which parts of their idea would work based on attributes such as *trajectories; thresholds of activity; cues messages, and signals* etc. Participants in the interview often described how specific aspects of the framework applied to them or their team better; sometimes, the components of the framework worked better for the process than the framework in entirety.

Some of the components that stood out were:

Honey Pot Effect

“honeypot was useful - part of the KISS effect.”

¹² KISS standing for “Keep it Simple, Stupid” was first used by the US Navy and Lockheed Skunk Works as a design principle in the 60’s. It states that most systems work best if they are kept simple and that simplicity should be a key goal in design. It’s a common principle used by students at the Institute to make sure designs don’t get overly complex.

"...we actually used that word [honey pot] throughout the semester...what will be our honey pot - half as a joke and half as what will cause that effect."

Evaluation Apprehension/Social Embarrassment

"[describing evaluation apprehension] I remember a conversation about barriers to entry. Object was to entice people more to overcome this barrier. That was very much a filter that we used."

"This [social embarrassment] is a critical area of public interaction - even though people have desire to interact with things, they won't if they think they are going to make a fool of themselves. A lot of designers don't pay attention to this - they are focused on the object and not the user."

Thresholds of Activity

"We had a lot of discussions around the idea of focal awareness. What stood for me was this idea of dynamic-passive and dynamic-interactive...how do you basically teach people that something is interactive without them interacting with it."

"I think this is one of the frameworks [Thresholds of Activity], the group and I found it useful to realise that people are drawn to something that is changing the physical presence of the context, in some way...as they became more and more intimate with it."

Cues-Messages-Signals

“we did talk about the whole [cues-messages-signals]...that was a big one in how we would approach the physical installation...it’s a great framework for the actual design part. Are we doing something comprehensible for people - how do people know how to interact with it?”

“I think Cues are really important...in a public installation you are trying to instruct people how to use something...or what something is. If you are doing a public installations, the best ones don’t have signs in front of it. If you go to the "bean" in Millennium Park, you immediately start to interact with it - there are all sorts of cues that give you that.”

The specific aspects of the framework that stood out to the students were the ones that had a direct practical application to the design of the installations. These components could be used to design the installation in the real world. Cues, Messages, and Signals were in particular highlighted by most of the students as something that they appropriated easily for their own concepts. But not all components existed within the framework provided. Participants would use the basis of the framework to come up with new ways of thinking about urban installations. Some of these came up in the interview discussion, while some were a result of the provocation during the card sort exercises. Examples of this:

“When I think of users in a situation, I think of "occasionalisation" - Why are they are? What are they doing there?”

“Games are sequential, they have a beginning and an end + games have rules - you have to learn a game; Toys are much more freeform. For a public installation it’s much more powerful if you have a toy than a game.”

Occasionalisation is a word that this participant borrowed from digital marketing to build solutions for specific behavioural attributes of viewers based on their context and situation. In many ways this is similar to *Situational Intent* derived as an insight in the Art Loop Open project. Occasionalisation or *Situational Intent* played a large role in how the teams determined if one concept worked over another and is an important characteristic to consider moving forward. The second idea of contrasting games and toys essentially describe *trajectories* that a designer may design into an installation. This is again another important factor for designers to consider – how will user experience flow and what affordances must be made to accommodate deviations from the original plan.

7.4.1 Limitations of the framework

However not all of the responses were positive. During the exercise *all* the participants proposed a different structure for the framework, clearly indicating that the structure of the framework needed to align better with the needs of the designer.

Some examples of comments during the card sort exercise:

“I would start [with] what I consider Context and early research. We would want to know about the environmental condition, who is our user group, what's going to be the basis for success. [Then] knowing that we are doing some sort of public event or exhibit - the critical elements would be about Messaging, Signals, Cues, User Expectations, Interaction, and User Dialogue. [At this] point we would try to make sure we get the engagement working. Then this goes a little bit deeper...this would be the interface - how your users actually engage with whatever it is...avoiding the barriers of entry - getting it so good that people keep coming back to it.”

“[start with] analysis of the context and people... considering what to design, evaluating different sorts of interaction... [and] ending up on what do you do with that information.”

When asked to think of a new framework that will help in their own design process, these participants are suggesting that a potential framework must start with components to understand context, followed with some idea generation tools, and ending with components that help in the implementation of these ideas. These stages are the simplest way to think of any design – understand context, build ideas, implement these ideas. Even based on such simple categorization, participants suggest that the categories can contain different components that designers of interactive public installations find useful.

“I guess this small group is the high level abstract planning - trajectories, status, thresholds. We spend a good chunk of time understanding what the story would be - what would the trajectory/user journey be, how can we take people through that? [Next] I am looking at the interaction... [it's about] tactics and strategies, how can the interaction actually play out. [And] this bucket has to do with [users'] actual engagement; it's really just planning out how people can actually engage with it, developing user dialogue, trackable metric...”

“First thing I am thinking about are these conceptualisation phases...I would need to understand about the space - what are people doing there, why are they there? [The] second grouping that I would put together is sort of the movement from understanding something is to actually wanting to interact with it. I am seeing something, I am understanding what it is, putting it in some sort of context, figuring out what I can do with it. [And] now I am actually interacting with it. So there is this idea of what it's telling me - how is it instructing me on how

to use the system, how is it communicating with me? For me interactivity is a conversation - what is this conversation? Is it a polite conversation...?"

These participant quotes distinguish between the need for abstract planning and practical planning. The original framework did not make such a distinction, and brought all the components together at the same level. This is an important level distinction that will help in the building of a new framework.

All of these quotes suggest that when teams used the framework in generative mode, they found it missing several key elements – a context phase is one that was most commonly cited. The participants described the (missing) context phase as a front end phase that designers could use before they started the process of building the installation to help them understand the environmental and user context that the installation would be placed in. Another missing element identified by participants is a differentiation between “abstract planning” and “practical planning”. Planning at an abstract level involves understanding of philosophical concepts such as trajectories, status of the medium, honey pot effect etc. Practical planning is about implementation – when decisions have been made around the abstract level, how can designers then design these ideas into the actual installation? At this point, practical concepts such as Cues, Messages, and Signals, thresholds of activity etc. are important. Where conceptual planning is about coming to agreement on how to approach the problem, practical planning is about deciding what to do to solve the problem.

Combining the observations from the semester with the findings from the verbal interview and card sorting study, two key insights were derived. Put in simple terms, these insights corroborated the Art Loop Open study – that the framework is inadequate in its current form.

7.5 Key Insights from the Study

From the three modes of study with the State Street Projects: observations, interviews, and card sort, it was clear that a framework for interactive placemaking is helpful for designers when designing such installations. *All* the teams employed design frameworks in the development of their design, the most popular being the 5E's framework (Conifer-Research 2004), AEIOU, or asymmetrical matrix (Kumar 2012)¹³. But what about the PIE framework? What was successful, what was missing, and what can be learnt from how the students used the framework?

The following are the two key insights from this part of the study:

7.5.1 The structure of the PIE framework is inadequate

The most important insight derived from this study was that the structure of the PIE framework did not fulfill the needs of the designer(s) wanting to design an interactive public installation. The primary critique was that the structure of the framework layers user behaviour in the three basic constructs of *Perception - Interaction - Engagement* (PIE). This approach presents the interaction model from the user point of view - or in other words, this is how a user would see the interaction unfold. For a designer, while this is useful, it does not necessarily help in the design process. Such an approach does not enable the creation of new experiences. What is needed instead is a model from the point of view of the installation – what can the installation offer as a user transitions through the different stages of engagement with the installation. Or in other words, how might the installation guide the user through

¹³ Three of the many design frameworks taught as part of the core curriculum. As a method based school, students at IIT Institute of Design are encouraged to use such frameworks in the process of design.

these transitions? What steps should a designer employ in the process of designing for such engagement?

Many of the students chose to "adopt" the PIE framework or specific components from the framework, and then develop their own versions. In essence, this enabled the teams to add their own creative ideas on top of existing information. Take the example of the version developed by the ZeroZero team. They took the existing PIE framework and designed a new framework to work for the particular design context of the ZeroZero project. This version takes the Perception-Interaction-Engagement construct of the PIE framework and mashes it together with the 5 E's framework (Conifer-Research 2004) which describes the stages of an user as s/he moves through an engagement – Entice, where s/he is enticed into engaging with the installation; Enter, where s/he decided the engagement is a worthwhile activity; Engage, where s/he actually engages with the installation; Exit – where s/he moves out of engagement; and finally Extend, where the engagement is extended beyond the immediate engagement with the installation.

Below is a mapping of the three frameworks together:

Perception - Interaction - Engagement

----- mashed with -----

Entice - Enter - Engage - Exit - Extend

----- leads to -----

Art - Interaction - Information - Nostalgia.

This is referred to henceforth as the ZeroZero framework. What is interesting about this framework is that it is presented from the point of view of the installation and describes how

the installation might present itself to the user, and how the user could (over time) engage with the installation. This is a subtle change from the PIE framework which only looked at how the user might “see” and engage with the installation. At the very basic level it suggests that an urban installation should have “art” like qualities. This enables users passing by to view the installation and determine if they wish to interact with the installation or move on. If the user does choose to interact with the installation, it must enable for such “interaction” through the interactivity built into the system. Such interaction should provide the user with “information” s/he seeks. As the user continues to interact with the installation, the user should be able to develop a sense of “nostalgia” because of the information provided.

Clearly the PIE framework was not inadequate in terms of content. As can be seen from the responses of students, certain components of the framework were very useful to the teams. The inadequacy of the PIE framework comes from its structure. The ZeroZero framework could prove to be an important baseline. While the ZeroZero framework was specific to the needs of the ZeroZero team, conceptually it presents an interesting direction for rebuilding the structure of the PIE framework.

7.5.2 Framework must allow for conceptual as well as practical planning

The second insight comes from the responses of many students during the card sort study who describe that some components of the PIE framework provided conceptual level guidance, while some provided practical level guidance. Several participants suggested that design frameworks should differentiate conceptual planning from practical planning. The categorization of cards by users offered insights to how this differentiation might be structured. A conceptual framework allows designers to conceive of a conceptual direction for their project. A practical framework allows designers to change this conceptual direction into an application oriented format for implementation. Conceptual planning asks the question

“how users experience the installation”, while practical planning asks “how designers can design the installation”.

This differentiation is important for the rebuilding of the framework because it suggests that the new framework will need to be constructed at two levels. While the students suggested this, there is also theoretical precedent for such a differentiation. In their paper, Lim et al. (2007) describe how designers in other design fields build their practice from both *higher level interactions* and *immediate level interactions*. Higher level interactions according to Lim et al. are conceptual frames of reference which may not directly become tools for supporting the creation of aesthetic interactions but may help with understanding people’s experience with interactive artefacts. On the other hand, *immediate level interactions* support design decision-making and creativity to form concrete and graspable aesthetic interactions

These two insights together provide a potential direction for the re-structuring of the PIE framework. On one hand, the insight suggests that the structure needs to be revised in order that designers might better appropriate the framework for the purpose of design. On the other hand, designers suggest that any framework must provide for conceptual level planning and practical level planning. The observations and insights from the State Street project was instrumental in revisiting the framework. The restructuring that resulted is described in detail in the next chapter.

7.6 Discussion

Up until this chapter, the research followed a single format – take an existing installation, or design and implement a new installation, and then use that as the basis to study user behaviour in interactive public installations. This format was repeated several times, each study building on the results of the previous study. With each study, the PIE framework for

interactive placemaking evolved and changed. These evolutions and changes were gradual and slight.

The State Street Project however changed the research format considerably. In this study too, three urban installations were designed and implemented in the wild. However unlike the previous chapters, the installations were designed by *other* designers, students at the IIT Institute of Design as part of a Communication Design Workshop that I taught. This meant that for the first time since the conception of the framework, designers who have not seen the framework or its components before would have to read it, appropriate it, and use it in their design process. As evident from this chapter, this led to some very interesting insights regarding the framework, its structure, and its overall validity. At the end of the Art Loop Open project, it was clear that the gradual evolution of the PIE framework and the context augmentation was inadequate for the purposes of evaluating a large in the wild installation such as Hub37. As the different teams in the State Street Project used (or did not use) the framework, not only did it confirm the inadequacy of the framework, but also showed what was needed to improve it. The PIE framework and the context augmentation provided several components that were valuable for the designers, but the structure of the framework made it difficult for them to use it for the design of new installations. The most important observation is the *Perception-Interaction-Engagement* progression is presented from the view of the user as s/he engages with the installation. While this is somewhat helpful for designers, what is needed is a progression from the point of view of how the installation might present itself to the user. This shift, even if only slight, makes it easier for designers to employ the framework to design new installations. The three different evaluation methods adopted in this study highlighted two key insights that would help in the restructuring of the framework to address this issue. These insights along with other insights gathered through the course of the thesis is

used in the following chapter to revisit the PIE framework and re-structure it to serve as a generative and evaluative tool.

The prime reason why both ALO and the State Street Projects provided shifts in this research was that they occurred simultaneously. One project (ALO) was a large scale implementation, at the end of which it became clear that the framework needs to be rebuilt. And the other (State Street Project), provided the necessary direction for rebuilding the framework from the work of one of the teams. Following the interview and card sort exercise with students, it was also clear that differentiating the conceptual part of the framework from the practical part is also important. The combination of such a conceptual framework along with the practical framework brought into picture the idea of a new frameworks that designers could use for the design, implementation, and evaluation of urban installations. At the concept development stage, designers can use the conceptual framework as scaffolding for their own design idea. At an implementation level, the practical framework to evaluate the different components and technologies which will go into the actual build out. In the following chapter, these insights in combination with other insights from previous chapters are brought together to revisit and rebuild a new framework for interactive placemaking.

Chapter 8. Revisiting the Framework for Interactive Placemaking

The preceding chapters describe a methodological approach to the development of a framework for interactive placemaking. The purpose was to develop a framework that can be appropriated by other designers; which breaks down user behaviour into easily understandable units and can be used to inform interactive placemaking experiences. Throughout this thesis different studies were set up, first to construct a framework for interactive placemaking, and then to test this framework against existing urban installations, and new installations designed for urban contexts.

The first framework, the original (Perception-Interaction-Engagement) PIE framework was a collection of different behaviours in progressive and logical ordering. This drew primarily from established literature in the field from a careful evaluation of other researchers' work in this area. The selection of specific components that made up the framework was based on the how these components were used in the original research and the potential for their use in new generation of new designs. The arrangement of the specific components into the PIE progression was based on how the user might experience the installation, as s/he moves from perception to interaction and eventually into engagement.

In Chapter 4, two existing urban installations were used as case studies to test out this original PIE framework. The insights from these studies led to the development of an extended PIE framework, which presented a more relevant ordering based on what was observed at the two installations. Further on, in Chapter 5, the Post-it Note prototype was a new installation designed and implemented based on the extended PIE framework. For this study, the PIE framework became both the basis for the generation of the installation concept and the

evaluation of user behaviour at the installation once installed. At the end of this study, several key insights came to light and a new context augmentation was added to the extended PIE framework.

The extended PIE framework along with the context augmentation then became the basis for two critical design studies – Art Loop Open and State Street Projects, presented in Chapter 6, and Chapter 7. These projects occurred neatly simultaneously and showed several inadequacies of the framework for the construction of large public installations and when other designers employed it in their own design process. The two studies also presented several key insights into why the framework was inadequate, what was missing, as well as a baseline direction for the re-structuring of the PIE framework.

The following sections in this chapter will describe the process of re-structuring based on the lessons from all of these previous studies. The final framework that resulted from this restructuring is composed of two parts. The chapter concludes with a description of these two parts of the new framework.

8.1 Restructuring the framework

At the end of the last two studies, it became clear that the PIE progression is not an adequate structure for designers who wish to design interactive public installations. Two important criteria were highlighted in both the Art Loop Open and State Street Project studies:

- 1) The PIE framework presents itself from the view of the user as s/he comes into contact with the installation. Perception-Interaction-Engagement is what the user goes through. For designers this provides some guidance as to what might be designed at each of these stages but does not provide enough information as to what the installation might look like. An alternate progression can be derived from the

responses of students in the State Street project where the framework progresses through how the installation presents itself to the user as s/he comes in contact with it. This is a slight change in terms of ordering, but it provides major shifts in how designers might appropriate the framework, as evidenced in the previous chapter.

- 2) Designers require the framework to work at two levels – one at a conceptual level where the framework can help them think about how to build a plan for user experience, and second at the practical level, where the framework can help them think about how to put that plan into action. At the conceptual level, the framework must help in the generation and evaluation of design concepts and ideas. At the practical level, the framework must help in the generation and evaluation of actual components that go into the build out of the installation.

Based on these two criteria, the PIE framework can now be restructured into two parts:

8.1.1 For conceptual planning

Based on Lim et al.'s (Lim et al. 2007) proposal of differentiated levels for design frameworks, a higher level framework¹⁴ would be a conceptual framework which establishes meaning and context for interactive placemaking, a tool which designers can use to think about the installation and chart a trajectory for their conceptual directions.

The conceptual framework proposed here comprises:

¹⁴ It is not my intention to call one framework higher and another lower, the terminology is derived from Lim et al.'s paper. The frameworks should be seen at the same level. The only differentiation is that one is to help with conceptual planning, while the other helps with practical planning. Since these two parts are intended primarily as scaffolding, designers may choose to use them in succession, or iteratively, or interchangeably as need be.

- 1) aspects of placemaking that may not be immediately applicable in design yet they provide the basis for understanding relationships between theory and application methods and tools.
- 2) information that designers can use to conceive of installations, use as a starting point for their design.

One starting point for a new conceptual structure can be derived from the ZeroZero framework developed by one of the student teams in the State Street project (described in Chapter 7). The ZeroZero framework is a natural evolution of the proposed framework because it maintains the schematic essence (useful for evaluation) and adds on experiential aspects (useful for generation). In this manner the framework can be used both as a generative framework (for the design of installations) and as an evaluative framework (for the evaluation of installations once they have been designed). However the ZeroZero framework was very specific to the needs and requirements of the ZeroZero installation. In order to be generalisable, the framework needs reframing in a way that it can be applied to the design of any public installation. So what might such a structure look like?

The original ZeroZero framework was a mash up of the PIE progression with the familiar 5E's framework (Conifer-Research 2004) used by students at the Institute of Design:

Perception - Interaction - Engagement

----- mashed with -----

Entice - Enter - Engage - Exit - Extend

----- leads to -----

Art - Interaction - Information - Nostalgia.

The 5E's framework is a useful framework to think about a user's journey through any experience. Each E in the 5E's progression helps the designer to think about what components of the engagement might help a user move through to the next phase of the experience. This allows the designer to develop specific concepts to *Entice* a user into the experience, and help the user *Enter* into the experience. Once the user has decided to enter into the experience, the designer can come up with different ways users might *Engage* in the experience as well as propose concepts for a cohesive and connected *Exit* from the experience. Conifer suggests that the experience does not end there, because designers must also think of how users might *Extend* the experience beyond the immediate engagement they might have had.

Upon comparing the 5E's with the original ZeroZero framework, and based on the lessons of the previous studies, two changes will make it more relevant to other designers. The first is to reverse one of the steps; changing *Interaction* with *Information* provides a more relevant progression through an urban experience, as will be evidenced later. Furthermore, *Nostalgia* is only one way that users can engage with the installation and was specific to the ZeroZero installation. Other designers might use the general *Engagement* as the fourth step in the progression.

Thus,

Entice - Enter - Engage - Exit - Extend

Art - Interaction - Information - Nostalgia.

to

Art - Information - Interaction - Engagement.

This transformation significantly changes the way the user might interact with the installation. At the very first level, the user is *enticed* into the installation because it is presented as urban *art* – material and form configurations that make the installation aesthetically pleasing. Once the user *enters* into the experience, s/he shifts from peripheral awareness to focal awareness. During this phase, the user expects the installation to present some *information* about itself and its content. As we have seen in both the Post-it Note and Art Loop Open installations, information at this level can be designed in the form of *Cues, Messages, and Signals*. Using these the user can be now persuaded to move from focal awareness to direct interaction and encouraged to *engage* further. At this point, the installation must be able to *interact* with the user, and take him/her through the interactive experience housed in the installation. It must also enable the user to *exit* from the experience as well as *extend* the experience through continuous and extended *engagement*.

Using such a progression, the designer can now come up with concepts around how to construct a cohesive user experience. The new framework is presented in Figure 8.1 and explained in detail in the sections which follow:

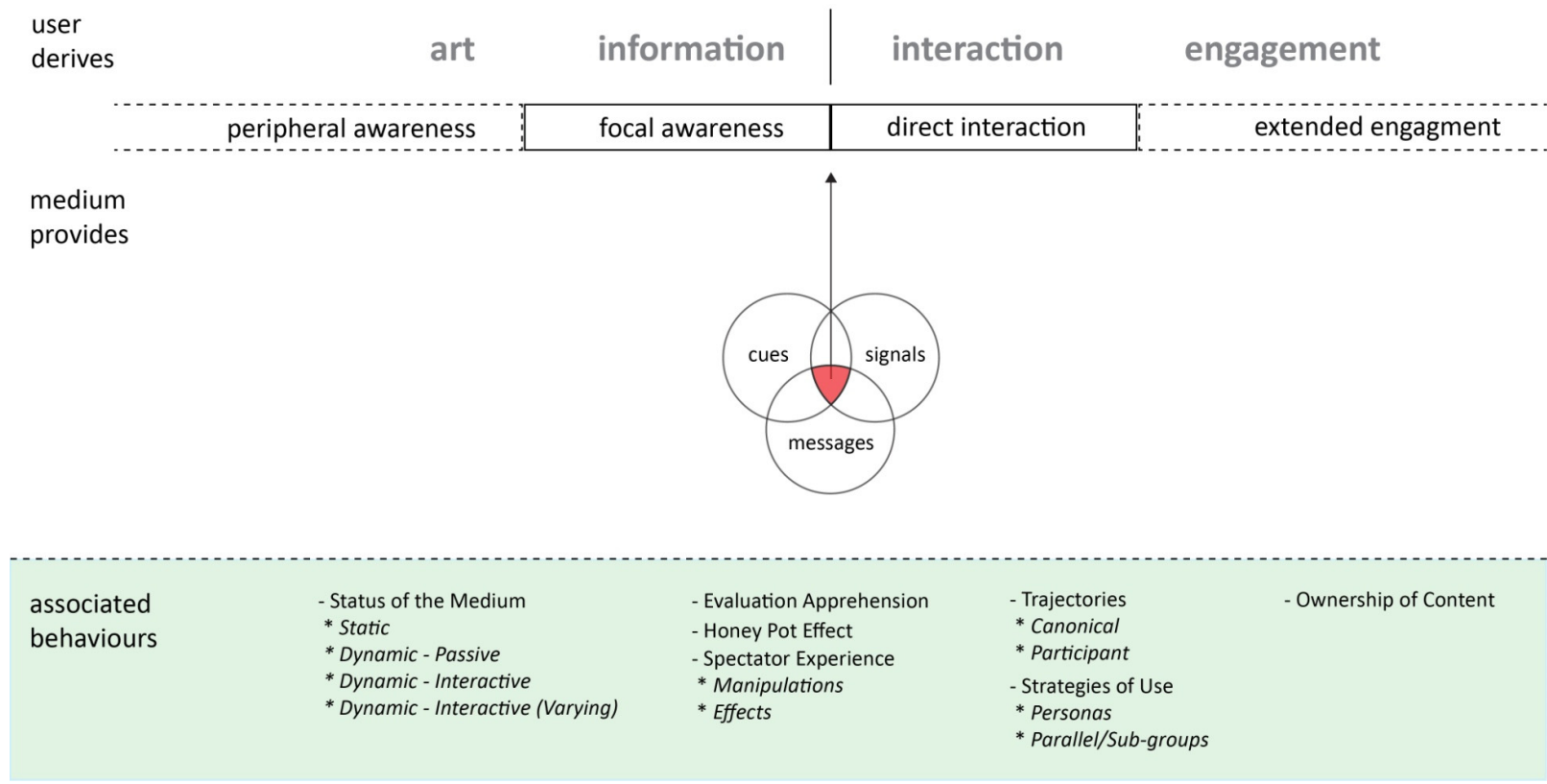


Figure 8.1 The proposed conceptual framework for interactive placemaking

The conceptual framework presented in Figure 8.1, shows the progression *Art-Information-Interaction-Engagement* laid out along the horizontal axis with the Thresholds of Activity. The premise is that as a user moves along these thresholds, the installation must change either in structure or as seen by the user to provide the right type of information required for that threshold. Mapping it alongside Thresholds of Activity follows insights from the case studies and Post-it Note study which show that the transitions along these thresholds can be aided by physical infrastructure built into the installation. Thus parts of the installation can aid the progression from Peripheral to Focal awareness and eventually into Direct Interaction. The original Thresholds of Activity (Brignull and Rogers 2003) however only presents three zones – *Peripheral Awareness Zone, Focal Interaction Zone, and Direct Interaction Zone*. Insights from the Art Loop Open study show that this is limited. Given the ability of users to take an experience immediate co-location with the installation, *Extended Engagement* is proposed here as fourth zone that designers must factor. Extended engagement allows the designer to consider how the installation continues the engagement beyond the immediate spatial confines of the installation. To accommodate this a new zone has been added to the framework along the original Thresholds of Activity – *Extended Engagement Zone*.

Mapped on the vertical axis is a distinction of what the user derives from the experience, and what the medium provides for the experience. This was part of the original PIE framework and helps designers distinguish what needs to be encoded into the installation and what might be derived from the interaction by the user. Four aspects of the experience are presented. These are states that the installation must progress through as the user transitions along the four threshold of activity zones.

The four phases of the conceptual level are:

Art

When the user is near or within the peripheral awareness range, an urban installation must entice the user to move into focal awareness. At this point, the installation serves as an “ambient display”, one whose primary role is to entice the user even on the periphery. One way to do this is to create an aesthetically pleasing appearance through either the construct of the installation itself or the nature of the interaction. By doing this, the installation may be seen by the user as *urban art*. This phase does not propose that designers should move into the realm of the artist, but rather that the designer should consider the visual impact of the installation on users. This is important, because urban art has a unique quality, as other designers have noted – it invites audiences to engage through interaction and, in so doing, participate in the realization of the work itself (Bilda, Edmonds, and Candy 2008).

Noë (2000) offers three qualities of urban art, based on which designers can design a visual impact into the installation:

- 1) Urban art is *environmental* and intrinsically site specific. Public art is not just enhanced by location, but are made for the locations and are meant to become part of the environment. This is particularly important when an installation is located in specific urban environments that may be significant in other ways to the urban citizen. This is true especially if the installation is located in historic sites, an important urban location, or within public parks. How users perceive and interact with an installation will depend on how it is situated in a particular location. Take for example, the ZeroZero installation, which was located at the intersection of State and Madison *and* situated within the Sullivan Center. Through its location it was competing with two historic elements at the same time –the intersection had a historic significance (it is the centre of Chicago’s addressing scheme) and the Sullivan Center was an iconic

Chicago landmark (designed by Louis Sullivan, a prominent American architect). To counter this, the installation, see Figure 8.2, was designed to meld into the context of the building while maintaining its own character.

In public settings installations must evoke a *visceral reaction* (Norman 2003) almost immediately. In order to do that, aesthetics, craft, and tectonics become important considerations for the designer. The design of user experience and interaction is important, but equally important is the colour, material, finish, and overall aesthetic considerations of the physical installation. The ZeroZero designers put in a lot of time and energy to build the installation as an urban sculpture, everything from colour of the map in the background, to the texture of the material used for the sculpture, to the font used for the text printed on the window. To create the perfect ambience, the team worked with a popular local artist who designed and created the map in the background of the sculpture. Each one of these was a conscious decision made after several iterations and concept development. The end result (Figure 8.2) was a beautiful installation that can stand alone as an urban sculpture even before users decide to move into interact with it.



Figure 8.2 ZeroZero's physical installation melding into its environment as a sculpture, yet its design offered a differentiation from the historic windows of the Sullivan Center

- 2) Noë's second characteristic is that art should be designed to be *lacking in perspicuity*, i.e., you cannot understand everything about the installation in one glance, and to be understood it must be explored. Accordingly, the design of a public installation must be carefully thought out such that while it provides enough enticement to a user to transition from peripheral to focal awareness, it must not give away too much. This posits a careful balancing act – on one hand, the installation must provide enough enticement to the user to move into interaction, while at the same time, it must not provide more than what is needed to help make that transition. The *lack of* immediately apparent cues and messages either in clarity of construction or presentation of content forces users to ask – “what is this?” The Post-it Note prototype, as seen in Figure 8.3, balanced these two aspects well. Most users were immediately able to see that the installation was built from post-its contributed by many users' but offered very little extra information. This persuades users to move

from peripheral awareness into focal interaction. And as evidenced by many studies in this thesis, once this transition is made, users are much more likely to move into direct interaction.



Figure 8.3 The Post-it Note installation was lacking in perspicuity, it did not tell users everything about itself and slowly revealed itself as users moved in closer.

- 3) Noë's third characteristic is that public art must *demand a reaction*. Through explorations users be able to ascertain that moving peripheral awareness to focal awareness is important, i.e. they are aware that something exists here, mostly because they can see how beautiful the installation is. But once they move closer to the installation, the art must also demand a reaction of some form. This reaction need not lead to immediate interaction; on the contrary, engaging in a Honey Pot around the installation, trying to decipher what the installation is doing, or how one might interact with it are all valid reactions. Figure 8.4 shows the Urban Forest³⁷ installation which was intentionally designed to be provocative. Every 72 hours the installation would

present a new question asking people to vote on random but connected choices – Chocolate or Caramel? Mittens or Gloves? The juxtaposition of such a provocation with easy interaction (you touched the window with your preference and your vote is recorded) provoked people to react many times and often. The question that had a polarising effect – Cubs or Sox (two rival baseball teams in Chicago), Willis or Sears (the controversial name change of an iconic Chicago tower) led to more reactions than usual.



Figure 8.4 Urban Forest³⁷ as seen from across the street shows how the aesthetic, craft, and content of the installation all demand a reaction from passers-by.

Information

When the user moves from peripheral awareness to focal awareness, s/he is looking for “implicit information”. Questions start to arise in the user’s mind – “What is this thing? Why is this occupying this space? Why is this leaf pulsing?” All of these questions entice a user to seek out answers. At this point, the installation must provide the users with some form of information.

This information can take on three forms:

- 1) *Cues* – Within spatial installations, users look for contextual cues to understand an installation and develop user intent. These cues can be spatial (where an installation is located) or experiential (how the installation is situated within a particular location). Cues are essentially information that is built into the design of the installation itself. A pulsing icon suggests that it can be clicked, or a soft curve suggests that it can be traced. These cues are often contextual and cultural, based on how users may read them. Figure 8.4 shows the Urban Forest³⁷ installation, which used the metaphor of trees and leaves. Each time someone touches a particular choice, the tree on that side grows by one leaf. Users know trees grow; and so when they touch the interface and see the tree growing by one leaf, they know that they are enabling the tree of their choice to grow more than the other. This is a cue built into the system. Even though there was no explicit message to describe this, users knew what to do. Cues are suggestive, meaning that they do not always explain in explicit terms what to do. Because of this conflicting cues can also be confusing. In the same installation, several conflicting cues confused users as to *where* they had to touch to register their vote. Sometimes reinforcing cues with messages may help to get the information across or sort out confusion. Note in Figure 8.5, even though there were confusing cues, the message “press here to vote” helped people to touch the right place.



Figure 8.5 A combination of Cues and Messages used in the Urban Forest37 installation helped users get over confusion regarding where to touch.



Figure 8.6 Messages at ALO were integrated through design into the installation. In this case the colours are kept consistent across the installation and messages were carefully positioned in the location.

- 2) *Messages* – When users have processed contextual cues, they look for explicit messages to supplement their interpretations. Messages are explicit in nature, meaning they spell out what to do either in the form of text or graphics or both. Messages can also be built into the interface in the form of interface elements or example interactions (such as automatic replays). Because of their explicit nature, it is best to integrate them into the installation itself. In the Art Loop Open installation (see Figure 8.6) users had to navigate through several different types of interactions. Messages told users what to expect and what to do at each of these, but these messages were carefully crafted into the overall design through colour consistency and positioning. Messages allow users to understand what is expected of them. However the more messages that are provided, the less interpretive the system becomes. This may not be a good thing especially in public creativity installations where the experience is derived from figuring out how other users interact with the installation.

- 3) *Signals* – In the lack of messages, users look for signals from a variety of sources to determine how to approach an installation. Signals may come from existing patterns of use; signals may also be in the form of manipulations of other actors, and the effects of the system in reaction. Users may depend on others to explain the system to them, or build consensus on a direction by interacting with others in a honey pot (see Figure 8.7). Signals are interpretive in nature, meaning that users build an expectation of what to do, or what is yet to happen, by looking at other users and interpreting their actions. Not all signals are synchronous. In the Post-it Note installation (see Figure 8.8) users left signals that were interpreted by other users asynchronously, in this case leading to a continuous drawing made up of art by different users.



Figure 8.7 A fourth user looks for signals from three others in a Honey Pot at Urban Forest³⁷.



Figure 8.8 Asynchronous signals at the Post-it Note installation often led to continuous drawings by different users over time.

As noted in the insights from Chapters 4 and 5, moving from peripheral awareness to focal awareness is the most difficult threshold to cross. At this point, the installation should provide people with enough information that will enable them to decide if this shift is worth making. Cues, messages and signals have an important role to play in enabling a person to move from focal awareness into direct interaction. Appropriately designing the level of information associated with an installation can help alleviate social embarrassment and lead to increased involvement from users. The appropriate balance of messages vs. cues also allows a user to build necessary expectations. In Art Loop Open, messages were used to explain interactions when users only needed to find more information (see Figure 8.9), whereas cues and signals were used when users were expected to engage in public creativity.



Figure 8.9 User reading instructions on a tag at Art Loop Open. The tags helped users find out more about art pieces and how to vote for them.

Interaction

The primary purpose of an interactive placemaking installation, and what differentiates it from other urban installations is its ability to support interactions. These may be interactions between the user and the interface, several users and the interface, or between users and users through the basis of the installation. Interactions at the installation should be able to support both “subtle” and “personal” interactions; all the while allowing the user to mitigate any forms of social embarrassment. Once the user is able to work through the process of interaction, s/he will start to engage with the installation. When interactivity is embedded into public installations, on the front end users can have a creative experience, and at the back end,

interactions can be tracked and traced. In the Urban Forest37 installation for example (see Figure 1.7), when users select one of the two answers they are on one hand interacting with the installation, while on the other contributing to the content of the installation. Other users gain from the interaction of one user – as more users vote for a particular question, that tree grows taller and bigger, this informs users on the ground what other people feel about this choice. Over time, many such questions also tells the organisation (in this case Chicago Loop Alliance) what the demography on State Street thinks and feels. In this manner, because interactive public installations combine both physical and digital infrastructure, they are able to extend experiences beyond traditional placemaking installations that rely purely on physical infrastructure.

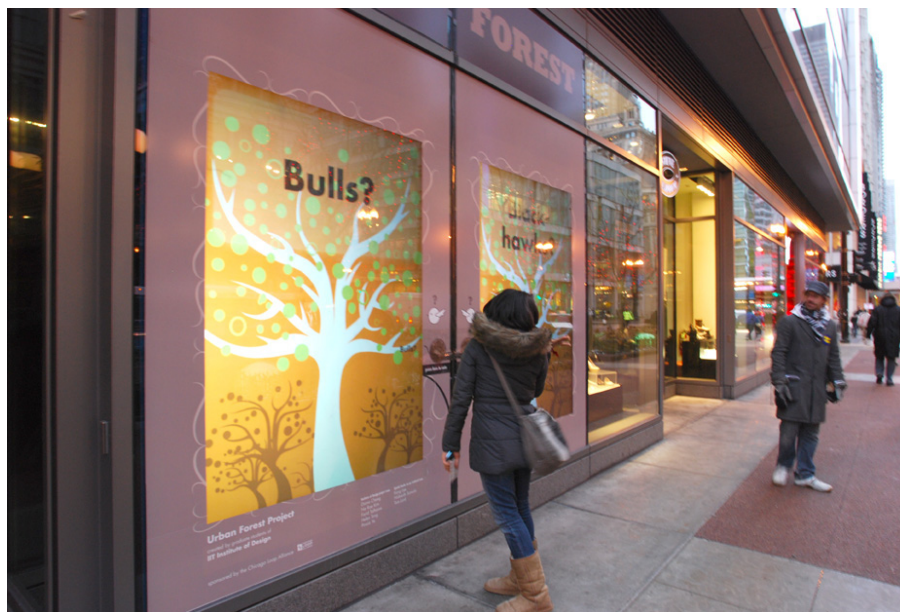


Figure 8.10 A user interacting with the installation at Urban Forest37 enables to extend the experience for others.

Engagement

Once people start to interact with an installation, the installation should have the ability to construct a deeper dialogue with them. Or it could act as a catalyst for a dialogue between

people. While traditional placemaking installations may do this through implicit means, interactive placemaking has the ability to do this through explicit means. An interface may encourage such dialogue by enabling the interactions between two or more users, even strangers (see Figure 8.11). Or it may do so through the content it presents in public space. Public creative installations can even extend personal engagements through the interactions between users asynchronously. In the Post-it Note prototype (see Figure 8.8) users were engaging with each other both in synchronous and asynchronous fashion. Once users cross the threshold from Direct Interaction to Extended Engagements, conversation that started in the physical location of the installation may continue beyond the located interaction. In Art Loop Open, this sort of extended engagement was encouraged through the use of the TwitterWall (see Figure 8.12) where users' tweets got projected in the form of community art and enabled them to continue discussions beyond the immediate confines of the Hub.

Another manner in which users can extend their immediate engagement is if the content of the installation is derived from the interaction of the user. At the Post-it Note prototype, Art Loop Open, and ZeroZero, the experience comes from aggregating responses from individual users over time. Thus the 'personalities' of these installations were in essence a composite of the personalities of all the users who engaged with the installation. A user who takes time to engage with these installations can choose to stop at the aggregate level or go deeper into the individual level to see what each person who interacted before with it added. In the Post-it Note installation for example, the idea that one's post may be built upon by others enticed people who added a note to return and see whether someone had added to it and how the note trails progressed.



Figure 8.11 Users engaging with each other, often strangers at Art Loop Open.



Figure 8.12 TwitterWall showing how users extended their engagement even when users were not physically present at the Hub.

Another benefit of interactive placemaking is that engagement is not limited to the users on the ground but also extends to the client agencies also. The back end information derived from the preferences of people can lead to interesting decisions or direction changes within urban agencies. If users are aware of this and feel that such decisions can lead to a positive shift in their own experiences, they may be more inclined to engage with such installations.

The above four phases *Art-Information-Interaction-Engagement* mapped along the Thresholds of Activity are designed to be the main the focal point of the conceptual framework. This is the frame upon which designers can build new ideas and innovations for interactive placemaking. The new progression allows a much more relevant approach to the design and evaluation of interactive public installations. However several components of the PIE framework, in particular some key behaviours are also important for designers to understand. Some of these key behaviours were identified and mapped along the progression in the same manner as the PIE framework.

Other behaviours

Associated with the conceptual framework are some key behaviours that tell designers what to look for in each of the four phases of creating an installation. These behaviours are derivatives of the original PIE framework and follow from insights of other researchers' work in the wild. However all of these behaviours that are part of the framework were evaluated in the studies presented in this thesis. Behaviours included and mapped as part of the new conceptual framework are:

- 1) *State of the medium*: The chief characteristic that will determine if an installation will allow a user to move into the future phases of information, interaction, and engagement is if the designer decides to design a static, dynamic, dynamic-passive, or dynamic-interactive system. This distinction is the first evaluation of the installation by

the user. Adequately representing this information in the form of cues, messages, or signals will enable the user to transition from the passive awareness threshold to focal awareness, and eventually into direct interaction.

- 2) *Evaluation Apprehension*: Users will try to figure out if interacting with the installation will lead to some form of social embarrassment. Social embarrassment is a key feature of a user's interaction with a public installation. The same installation in a more private space may not evoke the same type of apprehension in the same user. Furthermore evaluation apprehension can be affected by social interaction, the presence of friends in the space will reduce the embarrassment. Adequate information in the form of cues, messages, and signals will help mitigate this issue; designers can play with the information presented in the public space to make users more comfortable, or uncomfortable as required by the installation.
- 3) *Honey Pot Effect*: The Honey Pot Effect is a dominant phenomenon that was observed in all of the studies reported here. It offers users a safe mechanism by which they can evaluate installations in a public spaces. It helps users to engage in discussion about the content, interaction, or location of the installation. Designers should consider how to enable Honey Pots by providing adequate space and opportunity in front or beside the system. Honey Pots are also social constructs, they allow relative strangers to evaluate the situation and other users in a public space. While installations may not be able to directly influence the formation of honey pots, designers can accommodate them through spatial design when they do form.
- 4) *Manipulations and Effect*: The activity of users in front of the installation, and how the installation is designed to highlight or hide these will determine how spectators prepare to move into direct interaction. Reeves et al. (2005) present several ways in

which installations can incorporate the spectator experience. The visibility of manipulations and actions, or the lack thereof is a decision that designers need to make – a decision which will most certainly impact use and subsequent user experience with the installation. For example, the designer might choose to hide the manipulations of the actor but make visible the effects. To a spectator, this interaction seems “magical”, and thus changing expectations of the spectator if he or she decides to move into direct interaction. In this manner, the visibility of manipulations and effects is one of the key controls that the designer has in the design and implementation of public interactive installations.

5) *Trajectories*: As described earlier in the dissertation, planning the spatial, temporal, and narrative trajectories of the installation is another key control that that the designer has over the user experience. While the designer may embody the installation with a *canonical trajectory*, the actual *participant trajectory* may be different. Knowing this is critical for the design of public installations, because allowing users to deviate from the canonical trajectory ensures that each user experiences the installation slightly differently. The installation must be able to accommodate such deviations, or even more importantly encourage it. However the designer must also control the constraints of the trajectory, for the installation must establish the boundaries within which a participant trajectory will work best. Together, the design of the trajectory, and the constraints (or boundaries) will define the user experience of the installation.

6) *Strategies of Use*: While the installation may be designed to be used in a certain manner, users often find innovative ways to engage with it. The designer may not be able predict all such strategies, however potential strategies should be considered a

part of the design process. The knowledge of different strategies could also lead to the creative appropriation of such strategies into the design of the installation. For example, if users perform a co-ordinated countdown towards an event at the installation, the numbers counting down could in some manner become part of the design. From an evaluation point of view, the emergence of strategies, especially co-ordination between users or the development of personas (teacher-apprentice) may indicate a healthy interaction process.

- 7) *Ownership of Content*: Interactive placemaking installations that employ public creativity should also consider ownership of content issues – who owns the content that is generated by the user? Does the system appropriate the content once it is created, or can the user have access to it again? If users have access to content, can new users edit previous content or can they only review it? Not only must designers carefully consider these questions, but the options available can also be presented as part of the information embedded into such installations.

The conceptual planning framework is primarily composed of the progression Art-Information-Interaction-Engagement. However other behaviours included in the framework play a very important role in how users will appropriate the installation in the wild. Designers must not only consider the design of the installation from the view of the progression, but also the specific behaviours listed. But once a designer has conceived of a potential public installation, how can the designer start building it? The second framework, for practical planning offers designers a more operational approach.

8.1.2 For practical planning

Continuing the derivation of differing levels of design frameworks (Lim et al. 2007), such a practical level would enable designers to take the content of the conceptual framework and translate it into immediate, applicable implementations.

The conceptual framework proposed here comprises:

- 1) aspects of placemaking can be immediately applied on the field as the installation is being designed.
- 2) information that designers can use to build of installations, use as a starting point for their deployment and implementation.

A new order based on the manner in which all designers' progress through the design process can be used as the basis for the structure of a practical planning. The structure of the practical level is not different other iterative models for design. This was a conscious decision. As per the students in the card sort study (in Chapter 7), using such a structure means that its simplicity and familiarity will help in easy appropriation.

The students proposed using:

Understand context – Design based on context – Implement based on design

This order has been abstracted further into a simpler format for the purposes of creating a practical framework:

Understand context – Design based on context – Implement based on design

Determine – Design – Deploy

The new order at the practical level highlights an important criteria that was missing in the original framework – that of implementation. Once designers have determined what needs to go in to the specific context of the installation, designed the component parts, what gets implemented? The practical planning level allows designers to construct the “total user experience” which is essentially a combination of a conceptual and a practical approach to the design.

Figure 8.13 shows the practical framework using the structure described above. In the section following, each phase of the practical level is explained in detail.

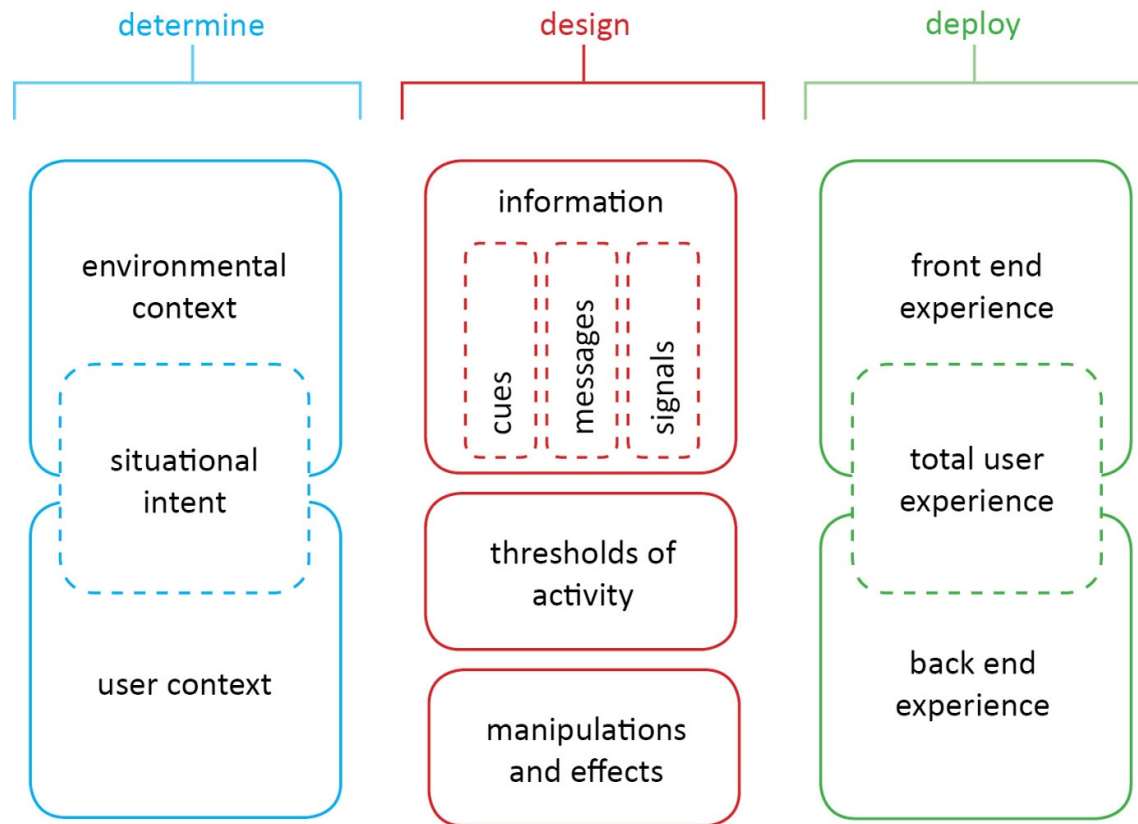


Figure 8.13 The proposed practical framework for interactive placemaking

The three phases of the practical level are:

Determine

The first phase for the designer is to determine the context in which the installation will be based. During this phase designers must determine what the environmental context and the user context is. Different techniques might be adopted at this stage, on the ground observations, video ethnography, site analysis, interviews etc. In Art Loop Open for example, a combination of these methods were used to understand what kind of experiences would work for the urban public spaces that the installation would be deployed in. The team conducted fly-on-the-wall observational research, engaged with users through structured, and semi structured interviews, and also involved primary stakeholders in a brainstorming workshop. Watching people interact with their physical environment revealed valuable clues about a range of tasks that users perform in the location and other related spaces. Teams in the State Street Project spent a large part of the semester observing users and the loop locations that were assigned to them. These observations proved invaluable in the design of the installations that went into each of these locations.

Together, environmental and user context will inform the designer of *situational intent*. What are the users in the space there to do? How can the installation build on top of this intent or subvert it? What trajectories must be designed into the installation that will allow users to move into direct interaction? Environmental context should also provide the designer with information about the location. This information can be used for the design of the installation especially its situation and construction.

Design

Once the designer has determined situational intent, the next step is to design key elements of the installation. Three key elements are identified here:

- 1) *Information*: The total information content of the installation consists of Cues, Messages, and Signals.
- 2) *Thresholds of Activity*: Where in the location does the installation allow the users to transition from peripheral awareness to focal awareness to direct interaction and eventually to extended engagement?
- 3) *Manipulations and Effects*: What aspects of the installation will be visible and what will be invisible to the participant and the spectators? This is based on the work Reeves et al. (2005) who suggest that what the designer chooses to show or hide will determine how the installation appears to spectators.

Sometimes the Design phase may require the help of multiple partners such as artists, engineers, and urban planners. A multi-disciplinary approach will help the designer see the installation from multiple points of view. In Art Loop Open for example, the design team worked closely with implementation teams – interior designers, computer programmers, and installation artists to design the overall experience of Hub37. Once the ZeroZero team had designed a conceptual direction for the project, they contacted sculptors to help them with the sculpture, an artist to help them with the map, a developer to build the online experience, and a lighting designer to help them with the illumination of the installation. In both cases, the total user experience was only achieved through the combined efforts of these individuals.

Deploy

Deployment of the installation is more complicated because the designer has to design and be in control of the total user experience. It is important to note that in all of the public projects that were done as part of this thesis, one thing was common. There were two users. One user is the urban citizen on the street, the person who will interact with the installation once it's installed. The other user is the agency which wants to install the installation. Many times these

two users will have two different requirements and use cases. This may be especially true if the agency may be interested in aggregating the information generated at the installation. For the designer, this means that s/he must be able to design the user interface and user experience (for the users on the street) – *the front end experience*; as well as the information and the technology architecture for the installation (for the agency that is interested in placemaking) – *the back end experience*. During deployment, a designer must be conscious of both these experiences, and that it is the combination of these that will lead to the *total user experience*.

Another important aspect of the complete user experience is privacy and security of user information. Since most placemaking installations will be installed in public spaces, the designer must also take care that both the front end and back end experience of the installation respects privacy of the users. In the WishState, Urban Forest37, and ZeroZero projects, the installations captured and provided the Chicago Loop Alliance with aggregate user information, but never specific information of any one user. This was agreed from the very beginning of the project and the team helped the agency with determination of user insights from this aggregate information. Another important consideration is that information projected by the installation may need to respect social and cultural etiquettes. In Art Loop Open for example, the Chicago Loop Alliance was particular that the installation avoid any politically volatile commentary. They were particularly concerned about comments about an upcoming mayor election in the city. The team wanted the installation to be apolitical and to enable this, the CommentWall was constantly monitored. A blacklist, whitelist system was implemented into the TwitterWall and monitored randomly to prevent the projection of any unwarranted errors.

Sections 8.1.1 and 8.1.2 list in detail the two levels of the proposed framework for interactive placemaking. The two levels describe the two ways designers can use the framework – at a conceptual level to conceive of their installations, and then at a practical level to plan and implement these concepts. But how can a designer appropriate the framework into a design process that they are familiar with? The following section lists two ways in which designers can appropriate the framework into their own process.

8.2 Employing the framework

In most design processes, designers will start at a conceptual level and then move into thinking about the practical aspects of their installation. If this is the case, designers should start with the conceptual framework and then move into the practical framework. However the two frameworks were built on top of each, and use similar components. They can be used iteratively, but not interchangeably. The practical level cannot substitute for the conceptual level, but a designer may choose to use them in succession, or employ them side by side.

The intention of proposing such a framework is to enable designers with a starting point. Thus, the framework must not be seen as the end of the design process but rather as a tool for design. In most cases, designers may have their own preferred design methodology. If this is the case they can use the framework as scaffolding for their own conceptual thinking or for implementation. At the conceptual level, the framework should help the designer to come up with new ideas and innovative applications of interactive placemaking based on the proposed progression. The framework is neutral and does not exhibit a preference to what actual methods or tools the designer may use to come up with ideas.

The conceptual framework also lists several behaviours intended to help the designer think about each phase of the progression. These behaviours are neither final nor exhaustive. They are based on the research available at the time of writing of this thesis. Designers can choose

to augment this list by adding new behaviours, or exclude behaviours that do not work for them. Once ideas are solidified and confirmed, the designer moves into the implementation stage, where the practical framework should help designers evaluate different factors that help in deploying these installations in the real world. Once again the progression is based on the iterative progression used by most designers. This makes it simple to appropriate and embed into a designer's preferred process.

Section 3.6 of Chapter 3 lists two qualities of frameworks that make them attractive to designers: the primary function of frameworks to be easy to use by designers as scaffolding for new ideas and concepts. Some frameworks may also be helpful as both generation (come up with new designs) and evaluative tools (evaluate an existing design). A secondary function of frameworks is to act as communication tools. In this form, they are mnemonic devices that help the designer communicate an idea among different stakeholders in the process. How does the proposed framework hold up to these qualities?

As a generative and evaluative tool

The proposed framework enables designers to employ it either as a generative tool or an evaluative tool. For generation of new design concepts, the conceptual framework describes the progression of the installation as a user moves along different thresholds. A designer can take each phase of the progression and come up with concepts around the user experience at that stage. For example, a team of designers can start with the first phase of the progression – *Art* – and brainstorm how the installation might be situated within the proposed location and build to look beautiful in that situation. Different concepts may be evaluated in this phase; as these concepts get agreed upon, the team may move onto the next phase in the progression – *Information*. Now they brainstorm what cues, messages, and signals should be built into the installation. This process continues until the team moves through all the phases of the

progression. Once the team has come to agreement about the conceptual aspects of the installation, they can move into the practical level. Or they might choose to employ the practical level along with the conceptual level. At the practical level, the design team will take their ideas and implement them moving along the three phases *Determine – Design – Deploy*.

As an evaluation mechanism, the conceptual framework can be used to deconstruct the design and use of an existing installation. The progression *Art-Information-Interaction-Engagement* in this case can be used as category headers to list different qualities of the installation in each of these phases. The Thresholds of Activity zones can be used to list out different user behaviours observed at each of these thresholds. When listed, these two attributes – what is encoded into the installation, and what user bring to the interaction, can be used as heuristics for the evaluation of the installation.

As a communication tool

A secondary purpose of the framework is as a communication mechanism. The *Art-Information-Interaction-Engagement* and *Determine – Design – Deploy* progressions were intentionally designed to be easy to remember and bring up in conversations. A designer can quickly point out which phase of the design s/he is currently in, and what phases remain to be covered. At the conceptual level, this enables the designer to communicate with the different stakeholders involved. During brainstorming and concept development for example, the progression can serve as category headers for sorting the different ideas. At the practical level, this enables the designer to decide if enough input has happened at every phase and whether it is appropriate to move forward.

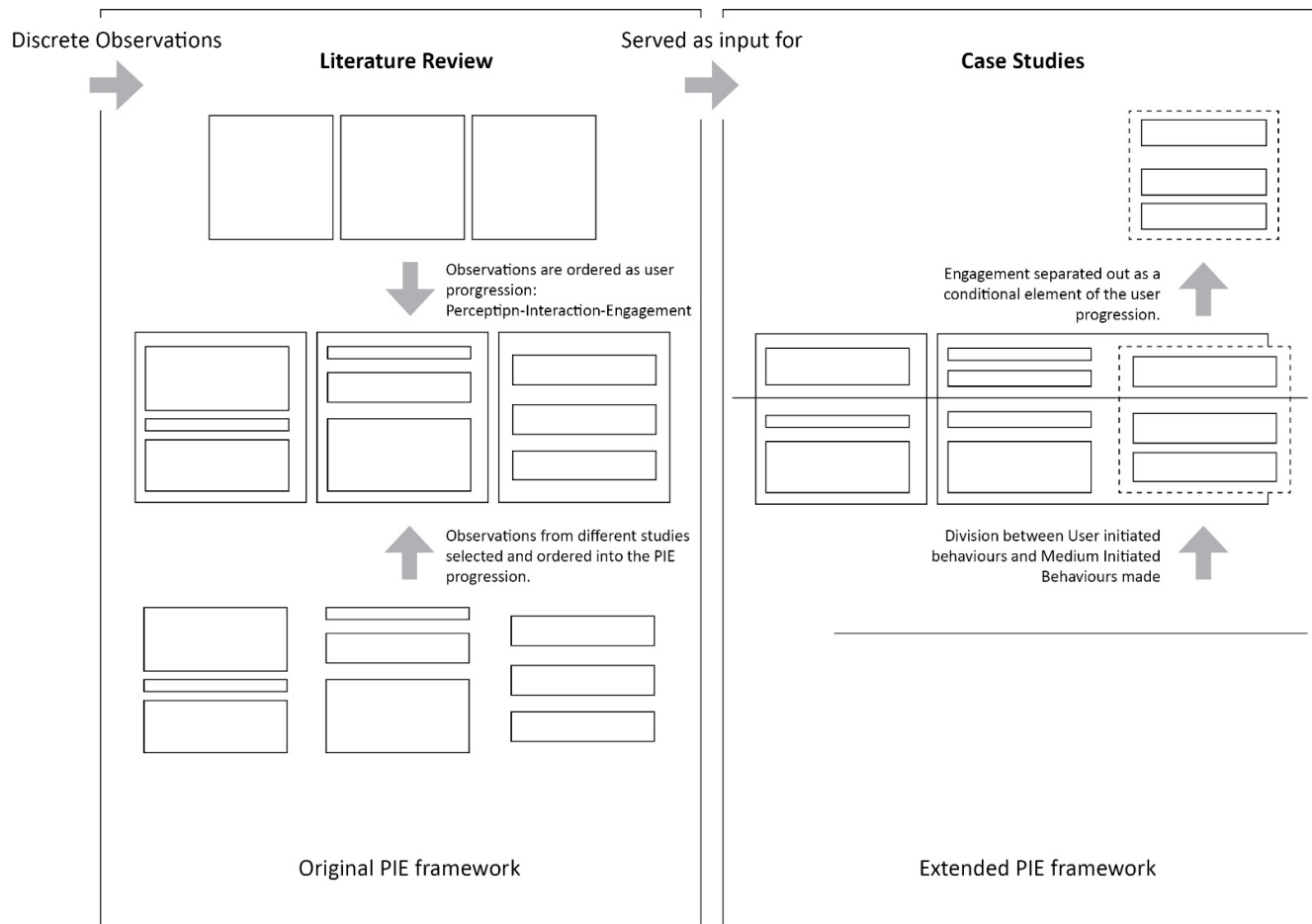
8.3 Evolution of the Framework

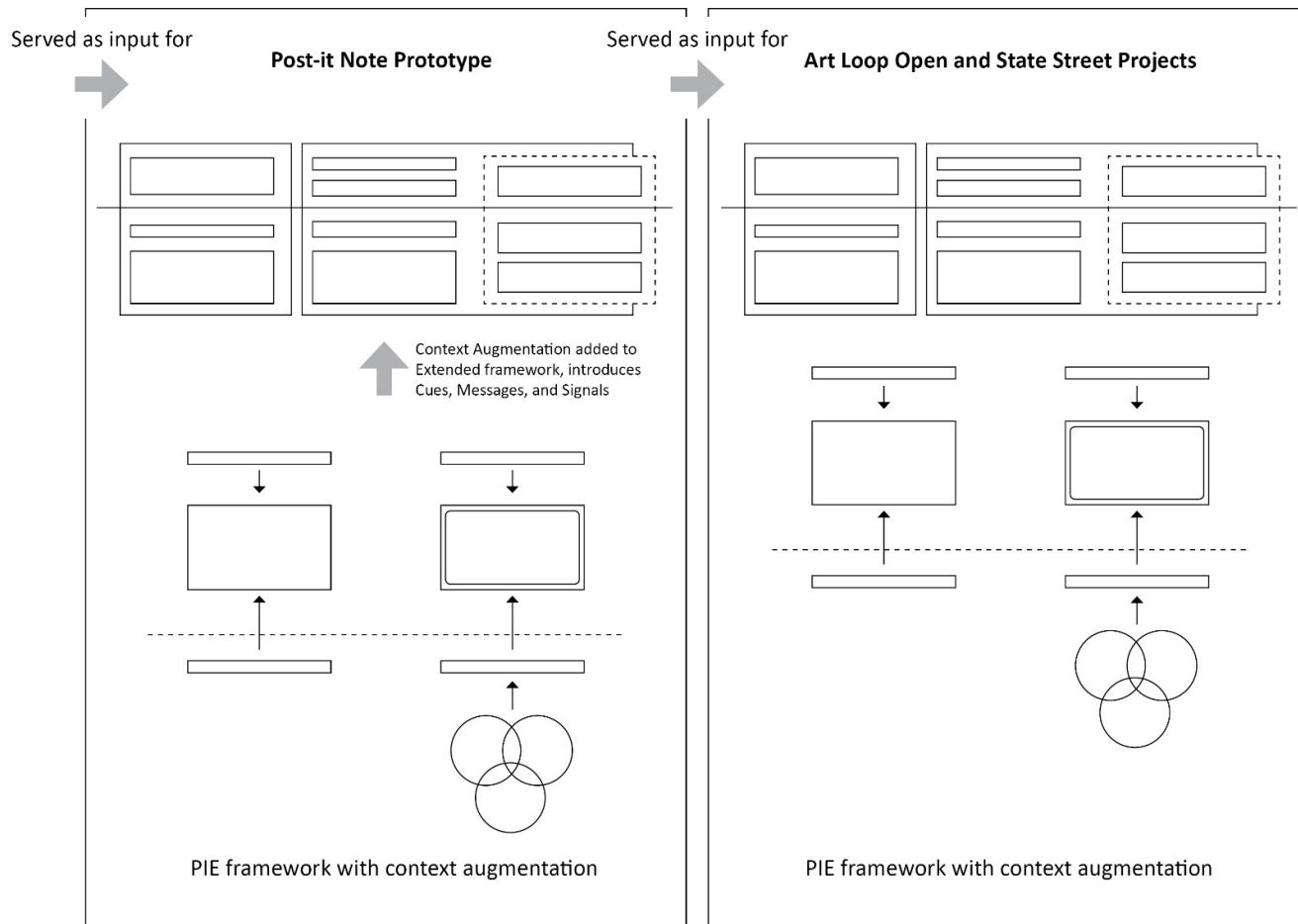
What started as an ordering of behaviours from existing literature, the PIE framework has been put to test several times through a series of different studies throughout this

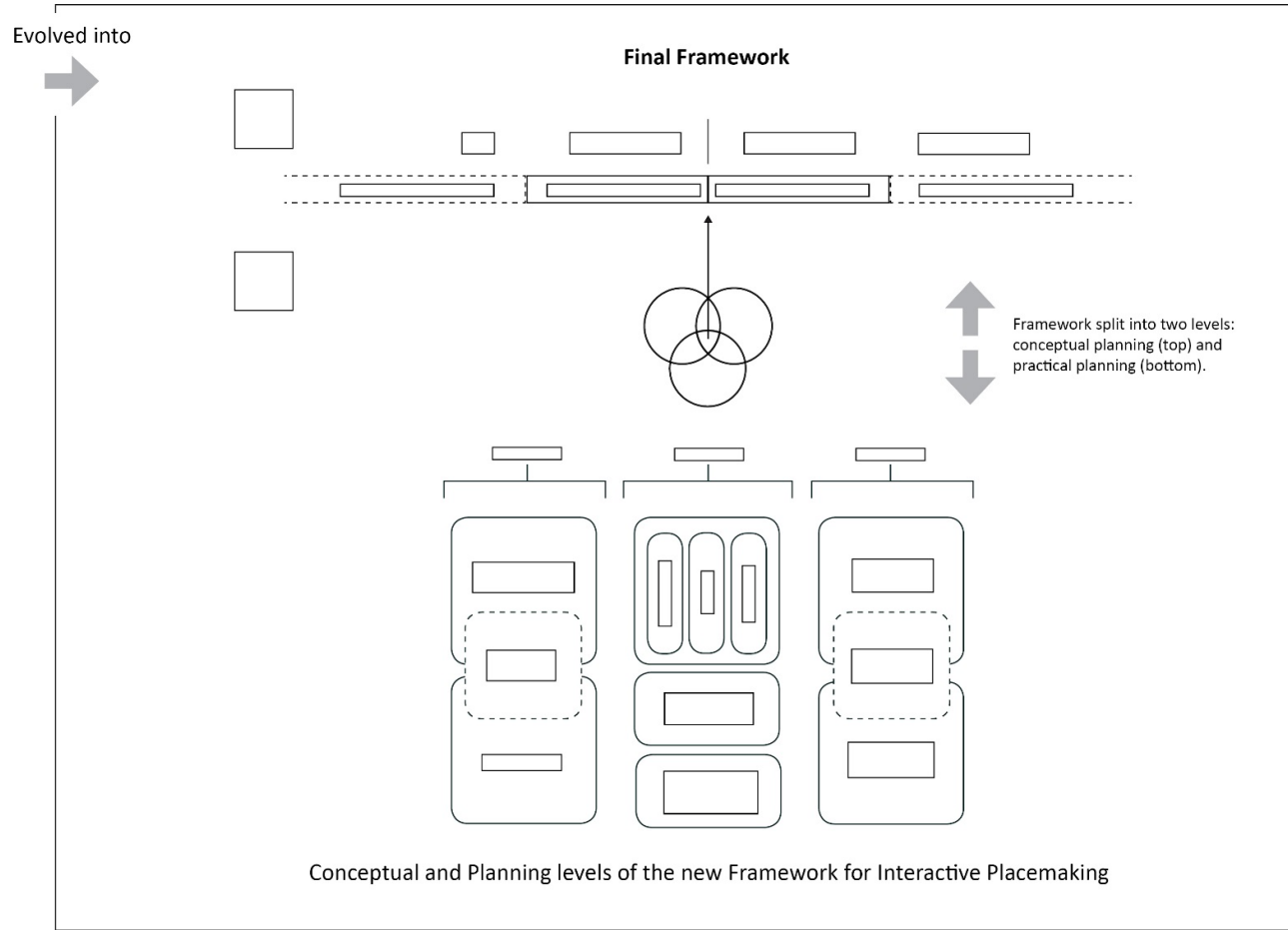
dissertation. With each study, PIE framework evolved and changed. Ultimately the last two studies, Art Loop Open and State Street projects helped in restructuring the framework into a more relevant progression.

Figure 8.14 shows the framework as it evolved across the many studies in the form of a diagram, and shows how each study helped the framework change. It is interesting to note how each previous framework becomes the input for the next study. The evolution also notes the additions and subtractions that were made to the framework and the key impetus for these changes. The purpose of this diagrammatic representation is to capture how the framework changed in both structure and design. While the final conceptual and practical levels looks different from preceding PIE frameworks, this evolution diagram shows how they are not dissimilar in structure or essence.

Figure 8.14 (following): The evolution of the framework through each study of this thesis, showing the additions and subtractions made at each level, as well as the key inputs that went into each evolution.







Chapter 9. Conclusion

The primary motivation behind this thesis, as explained in Chapter 1, is to bridge design practice with design and computing research with regard to *interactive placemaking*.

Placemaking is a term that architects and planners use to describe the creation of urban spaces that attract people because they are pleasurable or interesting. Interactive placemaking is the creation of urban spaces that are both interactive and responsive. Whereas placemaking is the process of putting together physical infrastructure such as street furniture, landscaping, lighting etc., interactive placemaking adds in technology and computing elements such as urban screens, ubiquitous computing etc. Interactive placemaking has the potential to augment, maybe even supplant traditional forms of placemaking. More and more agencies are turning to designers to develop these new interactive and reactive installations in public spaces as a quest to create the modern agora.

One way to bridge design practice with research, is to look beyond technology into user behaviour in the wild, to develop insights from observing this behaviour, and ultimately utilize the lessons to design future placemaking experiences. While several frameworks, methods, and tools are available to designers for the design and development of traditional placemaking experiences, no such frameworks and tools exist specifically for interactive placemaking. In fact, a key challenge identified in Chapter 1 is the development of such a method or framework that can provide guidance and advice on designing for interactivity that engages citizens. The intention of this research was hence to feed the findings from a series of studies into a comprehensive framework for interactive placemaking. The idea being that such a framework could potentially help designers in the field to build new and innovative interactive placemaking installations. This was done not as a way to come up with new technologies but

to help in the construction of new installations which use existing technologies and knowledge.

In order to create such a framework, I started by looking at research in the fields of computing and design – seeking to find behaviours, insights, and findings that could be used for interactive placemaking. While very little work is being done specifically in the field of interactive placemaking, the concept of space, place, and its impact on human cognition are commonly explored themes in HCI and design literature. The original framework comprised of key findings, insights and ideas from relevant literature that showed how to consider the core aspects of designing interactive installations. These findings and ideas became the components and was ordered along a simple progression – *Perception-Interaction-Engagement*, and was called the PIE framework. The PIE framework was particularly useful in evaluating two existing placemaking installations in Chicago. The components of the framework helped to focus on how people notice, approach, engage and share with others their experiences at these installations. However the framework had to be generalizable to a number of settings; this was part of the reason for using the framework to generate and evaluate different installations through the course of this thesis. Following the case studies, the PIE framework was used to design a controlled installation called the Post-it Note project and a large scale installation in the wild, called Art Loop Open. Public creative installations are a class of interactive placemaking installations proposed through these studies and define installations which are built on creative content derived from the contributions of several users over time. With each study, the framework was evolved so it could be used by others. The final study was an evaluation of different designers, in this case design students, might appropriate the framework. Their feedback was invaluable for refining the framework further and validating its utility for generating and constructing ideas for new interactive placemaking installations.

9.1 Contributions

The main contribution of the thesis is a new framework for interactive placemaking, evolved through findings from empirical data collected in a series of user studies with different interactive installations and in different contexts.

Chapter 1 lists three main research questions that the research sought to answer. To elaborate on this main contribution, these research questions are revisited below:

What insights can be derived from observing users engaged in public interaction?

In this thesis, different prototypical studies were used to study user behaviour in interactive urban installations. All the studies were in-the-wild and looked at how users interacted with a diversity of installations in urban or public environments. Each study presented key insights into how users might engage at these installations and are listed below.

Chapter 4 described observations at two existing installations in Chicago. At the beginning of the chapter, the original PIE framework is constructed from a simple ordering of components derived from literature review. Key insights which came from this study are:

- 1) Transition from the thresholds of Peripheral Awareness to Focal Awareness is toughest to make for people as they engage with installations in urban contexts.
- 2) Physical infrastructure can aid transitions between Thresholds of Activity especially if the infrastructure can persuade users to make the jump from one zone to the other.
- 3) Engagement is not always automatic, and is dependent on the social ecosystem, technological context, and the level of information encoded into the installation.

Chapter 5 presented the study of an in-the-wild prototype installed in the controlled environment of IIT Institute of Design. This prototype called the Post-it Note installation provided a canvas for users to use post-it's to create collaborative art. An extended PIE

framework based on the insights of the previous study was used to design and evaluate this installation. Key insights which came from this study are:

- 4) Ownership of user generated content is respected by all users and plays a large role in the experience at public creative installations.
- 5) Cues, Messages, and Signals are three important attributes of the information encoded into a public installation.

Chapter 6 presented the study of a larger in-the-wild prototype installed in Chicago. Known as Art Loop Open, this project helped in using the framework to design and evaluate an installation that was used by 1000's of people daily. The extended PIE framework with a context augmentation was used as the basis of this project. The context augmentation was a result of the insight from the previous Post-it Note study. While the Art Loop Open project led to some very interesting insights, the most important insight was that the PIE framework was inadequate for the design and evaluation of large scale installations such as Art Loop Open.

Key insights which came from this study are:

- 6) Situational intent is user intent based on a user's specific situation at a specific point of time. Constructed as a combination of the user context and environmental context, situational intent plays a large role in whether and how users interact with public installations.
- 7) Asynchronous conversations are a natural part of public creative installations and enable users to extend their engagement beyond the immediate spatial confines of the installation.

- 8) Back end experiences must be as good as front end experiences in interactive public installations, as both the users on the ground as well as the supporting agency interact with the installation in different forms.

Chapter 7 presented three interactive public installations that were designed and deployed on State Street in Chicago. While the installations themselves were not studied in detail, the student designers who designed these installations provided feedback that helped to re-structure and evolve the framework. The two insights from this study were critical in developing a conceptual direction and for the development of the final framework. Key insights which came from this study are:

- 9) The structure of the PIE framework was determined as inadequate for designers to appropriate. A new structure was needed and derived from one of the teams in this project.
- 10) Framework must allow for conceptual as well as practical planning. These differing levels allow designers to shift between conceptual ideas and practical implementation requirements.

How can these insights be abstracted into a framework to inform the generation and evaluation of new interactive public installations?

As mentioned, the thesis proposes to build a new framework for interactive placemaking. The original PIE framework ordered key insights and ideas from previous research done by other researchers in HCI and Design. However as the thesis progressed it became clear that the PIE framework is inadequate for the purpose of large scale installations in the wild. Moreover, studies done with design students at the IIT Institute of Design suggested that the frameworks were not structured in a manner that they could appropriate easily into the design process.

Based on the feedback from these students, a new framework was proposed and explained in Chapter 8.

The framework is built in two levels – the first works at a conceptual level and is designed to help designers come with conceptual ideas for what an installation might look like. At the conceptual level, the framework layers the Thresholds of Activity on a horizontal axis along with the progression *Art-Information-Interaction-Engagement*. This progression is built from the point of view of how the installation once constructed will present itself to the user.

The second works at a practical level and is designed to help designers with the implementation of conceptual ideas. At this level, the framework is layered along a simple iterative process for design – *Determine-Design-Deploy*.

The new framework is a composite of all 10 key insights described in the previous section. The key behaviours and components from the work of previous researchers are part of this framework as well. Some of these elements such as *Cues, Messages, and Signals* are part of the core progression. Other ideas such as *honey pot effect, trajectories, status of the medium* are part of the associated behaviours. The construction of this framework shows that insights from the user studies can be indeed be used to inform generation and evaluation of interactive public installations.

The two frameworks are presented one after the other in the following Figure 9.1 and Figure 9.2.

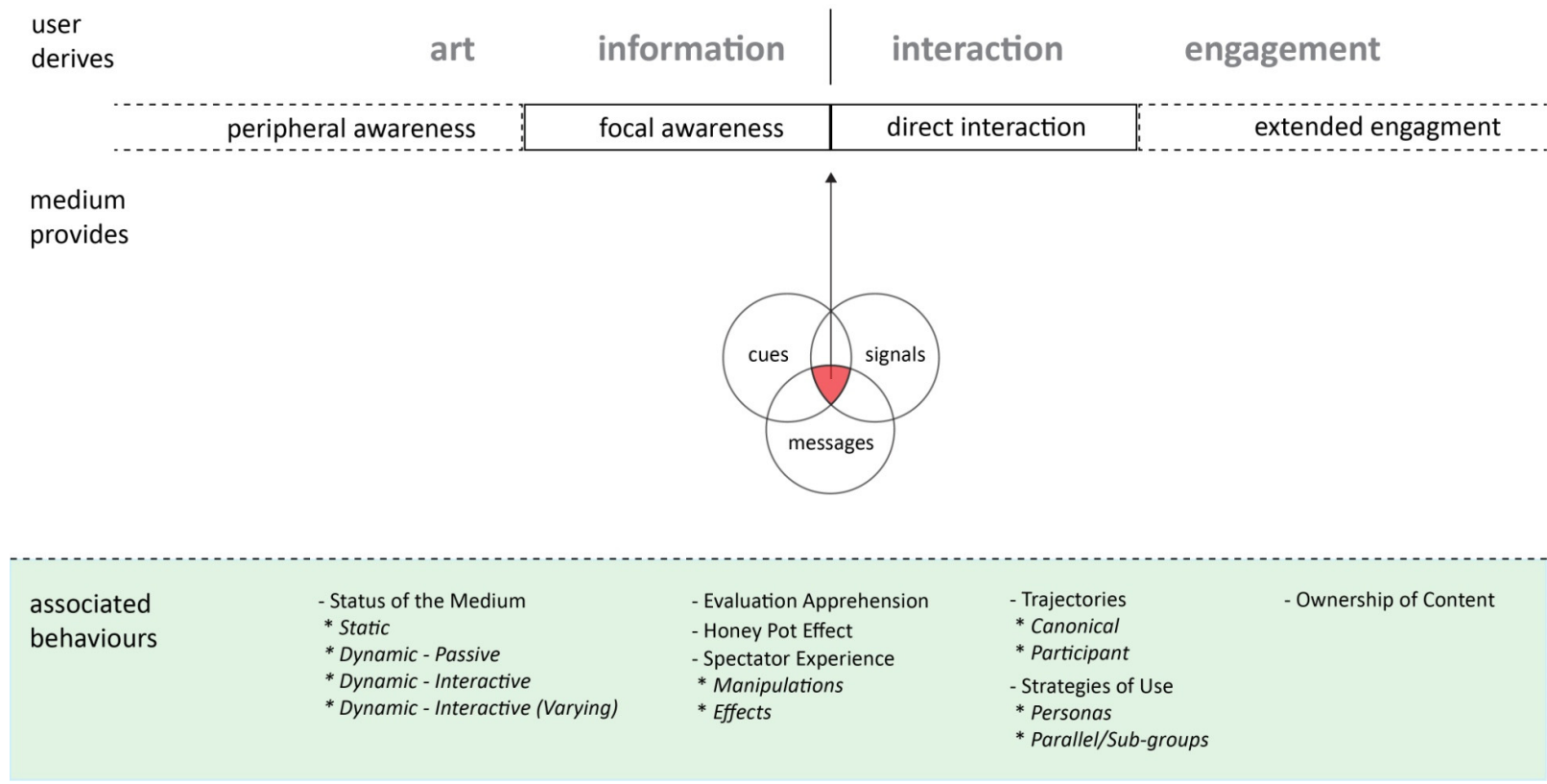


Figure 9.1 The proposed conceptual framework for interactive placemaking

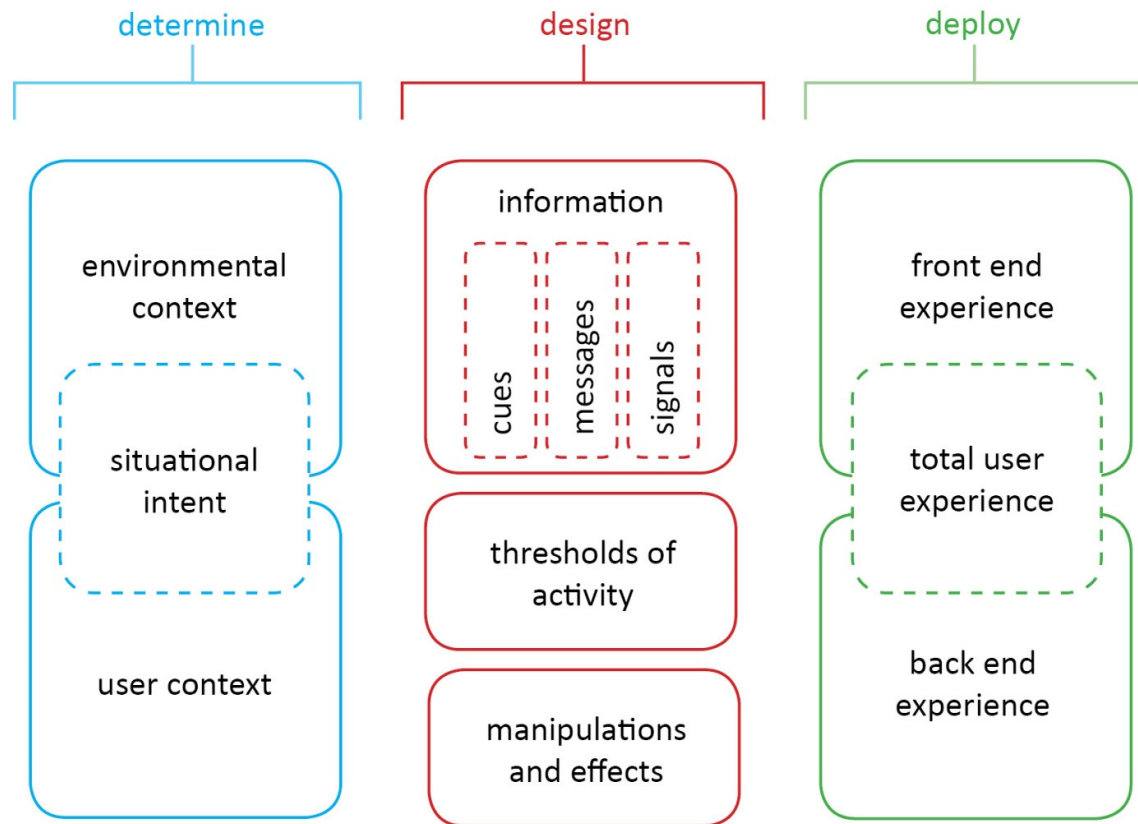


Figure 9.2 The proposed practical framework for interactive placemaking

Can and will designers employ such frameworks for the design and evaluation of interactive public installations?

Whether designers will use frameworks for the design of public creative installations is an important, yet difficult issue to ascertain. A broad evaluation of any framework will need time and resources that go beyond that which were available for this research. Nevertheless I decided to test the validity and usability of the frameworks by introducing them to postgraduate students of design at the IIT Institute of Design where I teach. The assumption was that as postgraduate students, they come with relevant experience, and upon graduation, most of them will pursue a career of design. As part of this exercise, the PIE framework was presented as a tool for a project in which they had to design real world urban interactive installations.

The installations that resulted from this project and the interview of these students is presented in Chapter 7. The students all suggested that a framework for interactive placemaking was deemed useful by the students. However the PIE framework did not get used by student teams. Most teams modified the framework based on the specific requirement of the project. During the card sort exercise as described in Chapter 7, it was also clear that certain components of the frameworks received more traction among the teams than others. The results of this study forced a re-thinking of the structure and design of the frameworks. This led to the new framework presented in Chapter 8, which is presented in two levels – one for conceptual planning and the other for practical planning. The specific components of the PIE framework which worked were retained in the new framework.

While a detailed evaluation of this new set of frameworks is not within the purview of this thesis, the framework continues to be put to test in projects and workshops at the IIT Institute of Design. I have presented this framework to designers and urban planners in workshops and

conferences, receiving positive feedback at each of these events. It is understandable and expected that the framework will continue to evolve as others and myself use it to design and evaluate new interactive placemaking projects. Some of the projects that came out of using this framework have been described in the future work section of this chapter (see Section 9.3).

9.2 Limitations

The preceding chapters describe four user studies conducted in the real world to observe user behaviour and evaluate/evolve a framework for interactive placemaking. However while these studies are intended to be broad, they are by no means exhaustive. Furthermore, all the studies in the thesis are qualitative studies enabling both evaluation and analysis. Using qualitative research also enabled the studies to go deeper and posit why something happened rather than just say it happened. Additional studies to verify some of the assumptions and qualifying quantitative studies were not conducted. Further validation will come through future studies, and extensive dissemination of the frameworks. Some of this will be achieved through planned publications, some through teaching, and some through new research directions described in the following section. It must be re-iterated that the nine Institute of Design students that were evaluated as part of the State Street Projects do not represent the totality of all designers who currently work and are interested in implementing interactive placemaking initiatives. They were intended as a sample representation to see if their collective reaction could be used to evolve the frameworks. As these frameworks are exposed through teaching, workshops, and research publications, more testing can be done and further validation can be attained. As with all projects of this nature, this research was also limited in terms of time and resources. The final frameworks presented in Chapter 8 are a result of iterative testing and validation of the original PIE framework. However the final conceptual and practical frameworks have not been subjected to the same rigorous evaluation process as

earlier frameworks. They should be seen as a design artefact resulting from this work that will need further evaluation. As we know, making a framework accessible and usable by others besides the researcher is challenging (Rogers 2012). The intention however is not to stop at the development of a framework but to continue to develop them; some of this being achieved through current and future work at IIT Institute of Design.

9.3 Current and future Work

Students and researchers involved in the design of installations for new interactive placemaking initiatives at IIT Institute of Design continue to use and build on the conceptual and practical frameworks described in this thesis. The following initiatives show how this thesis influenced future directions for research.

Just in Place Learning

Just in Place learning is a research project at IIT Institute of Design which explores how new digital media tools and environments are changing the landscape of science, technology and engineering education. The concept is built on the premise that new tools of interactive placemaking enable richer and more interesting contexts for learning to happen. Embodied experiences in the real world allow us to engage as well as learn from our physical world. It is when we stand in front of a bridge that we are most intrigued by it; and our head is filled with questions. At this moment, the bridge becomes a rich learning environment where information is relevant and useful for the person standing in front of it – one that has yet to be tapped as a learning resource. This is where “Just in Place” learning comes in.

Just in Place learning assumes that information has place and learning happens when information is engaged in place. Just in Place learning is a derivation of the phrase – Just in Time information (Intille 2004; Mathew 2005; Singh and Mathew 2007). Just in time information makes use of environmental and user context to determine when a particular set

of information should be presented. Just in Place learning adds place to this interaction – so information is not just presented “when” it is required but also “where” it is required.

This project is part of an ongoing initiative with the Chicago Architecture Foundation (CAF). Classes at IIT Institute of Design are currently working with CAF to see how they can use their large physical Chicago Model as an interactive placemaking hub and extend Just in Place learning throughout the city of Chicago. In 2013, IIT Institute of Design and the CAF plan to propose a new National Science Foundation grant based on the frameworks proposed in this thesis.

Urban Research Machines

A second direction provoked by this research is that of Urban Research Machines, a novel way to engage with new “connected” urban audience. These machines re-imagine how urban organisations can transition from traditional forms of user engagement such as surveys, focus groups, town hall meetings, discussion, and participatory design forums. While the modern audience is provided with many such opportunities to submit ideas and participate in discussions, organisations can often predict the demography that is likely to participate in these activities even before they happen. The modern user is a sophisticated and connected individual, for whom traditional models of outreach may no longer be the only relevant form of user engagement. Located in population hubs around the city (and sometimes not located at all), these “machines” re-imagine user engagement in the context of the socially connected urban audience. They are designed to serve as “constantly on” participatory environments for users to share, view, and collectively build on each other’s ideas. The interactions allow the urban audience “play” with information, and through such play share information, cooperate with one another, and to take collective action about the topic at hand. Unlike a focus group meeting, these machines do not have an engagement timeframe. Users can engage with them

when they want, and where they want. This enables organisations to hear a collective voice aggregated over many weeks instead of singular voices in one sitting. Information is often presented in a simple, playful manner which allows users of all ages and technological capability to engage with information.

In 2012, the City of Chicago's Department of Cultural Affairs and Special Events (DCASE) launched an initiative to develop a new cultural plan for Chicago. The 2012 Chicago Cultural Plan provides insights on how to elevate the City as a global destination for creativity, innovation and excellence in the arts. The focus of the project is to further build on Chicago's vast cultural assets and vibrant community, established through the collaborative partnerships formed with the public and private sectors and civic community. Public engagement played a key role in shaping Chicago's cultural future. Public community meetings were held and an interactive website enabled Chicagoans to submit ideas and participate in a discussion about the city's cultural future. In spring of 2012, DCASE engaged three IIT Institute of Design student teams to conduct user research, design, and deploy interactive urban research machines in cultural hubs around selected neighborhoods. The installations are designed to monitor interaction and capture user information at these hubs. At the end of the project, these experiential, located, and portable prototypes helped the City of Chicago, Department of Cultural Affairs and Special Events augment traditional forms of research by listening to the voice of a larger diversity of Chicagoans as they move through their everyday lives. The frameworks proposed in this thesis were a critical part of this design process and helped in the design and evaluation of the three installations for this project.

The Urban Research Machines research initiative at IIT Institute of Design continues to progress through potential future projects with organisations like the City of Chicago, the

Singapore Urban Redevelopment Authority, as well as corporations like Steelcase, Google, Accenture etc.

Moving forward

This thesis began with a description of the opportunities presented by interactive placemaking in urban contexts. It then explained the need and importance of comprehensive frameworks that designers can use for the design and evaluation of urban interactive installations.

Research identified a gap in academic and practice around such a methodological approach.

Through the studies conducted as part of this thesis, a new framework for interactive placemaking is proposed. Projects used as prototypes for the studies as well as current and future initiatives show how interactive placemaking is being exploited by different urban agencies. The framework provides me with a basis to continue to build and disseminate observations, insights, and frameworks through teaching, research, and publications. Students who graduate from design and HCI schools will continue to build new innovative urban installations as well as generate new knowledge based on this research. Urban and government agencies will have a better understanding of what they can ask designers and design firms to do in terms of new placemaking opportunities. Corporations will look to interactive placemaking and public creativity as a way of developing new research initiatives. Designers, firms, and consultancies have comprehensive frameworks that can be used for the design and implementation of the installations that come from these initiatives. And in conclusion the most important contribution is that designers of urban placemaking initiatives now have a formal and methodological framework for interactive placemaking.

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Appendix

Papers published based on the research projects in the thesis:

Chapter 5 is based on a paper published at ACM Creativity and Cognition conference:

Mathew, Anijo, Rogers, Yvonne, Lloyd, Peter; Post-it Note Art: Evaluating Public Creativity at a User Generated Art Installation. In ACM Creativity and Cognition'11, November 3–6, 2011, Georgia Institute of Technology, Atlanta GA. ACM Press, New York, NY. *[This paper was nominated for Creativity and Cognition 2011 Award for Best Contribution to Creative Communication]*

Chapter 6 is based on a Case Study published at ACM CHI conference:

Mathew, Anijo; Art Loop Open: Designing for the intersection of Art and Technology in an Urban Public Exhibition. In CHI '11: Case Study (Long) – In the Extended Abstracts of CHI2011: the 2011 ACM SIGCHI Conference on Human Factors in Computing Systems, May 7–12, 2011, Vancouver, BC, Canada. ACM Press, New York, NY.

Description of the Communication Design Workshop at IIT Institute of Design - Fall 2010

“Placemaking” is a term that began to be used in the 1970s by architects and planners to describe the process of creating urban spaces that attracted people because they are pleasurable or interesting. With the coming of interactive technologies and ubiquitous computing, the notion of “placemaking” has evolved as have people’s sensibilities and expectations. Today, “placemaking” is a composite arrangement of space (the geographical and physical construct); place (the aesthetic and memory construct); and technology (the social and connective construct).

This Communication Design Workshop will tackle the problem of “placemaking” from a specific point of view – that of the Chicago Loop. The Loop is an interesting “place” because it can be deconstructed into a complex array of historic artefacts, personal memories, political engagements, tales of businesses that succeed, stories of dreams that fail, and so on. On top of this evolving sensing, actuation, and interactive technologies provide us with new ways of constructing place – both spatial and connective. The workshop is sponsored by the Chicago Loop Alliance. Teams will work with the CLA and associated member organisations on 4 pre-determined spaces in the Chicago Loop.

The workshop follows some initial analysis work done by a team from UIC and will predominantly be “synthesis” oriented. The idea is to take this research and develop an interactive experience for specific locations in the Loop. The project will be implementation based which means each team will have to come up with an idea, test it, AND implement it in the time frame of the workshop.

Communication Design Workshop [Mathew]	Week 1 23-Aug	Week 2 30-Aug	Week 3 6-Sep	Week 4 13-Sep	Week 5 20-Sep	Week 6 27-Sep	Week 7 4-Oct	Week 8 11-Oct	Week 9 18-Oct	Week 10 25-Oct	Week 11 1-Nov	Week 12 8-Nov	Week 13 15-Nov	Week 14 22-Nov	Week 15 29-Nov	Week 16 6-Dec
			Labor Day (no class)				D&E 2010	Intersession								
Lecture																
Team Division																
Flash/Processing									Lynda 1		Lynda 2-3					
Arduino Tutorial				Intro	Lessons 0-3				Lessons 4-5			Arduino-Flash				
										Mid-Fidelity						
Client Presentations/Review	CLA	UIC			Concepts	CLA + UIC				CLA			Status Report			CLA+UIC
Understanding the Problem																
Evaluation of UIC work																
User Study - Intercept Interviews																
Precedent Studies																
Planning for the Project																
Evaluating the Space																
Evaluating Available Resources																
Negotiating Additional Resources																
Project Management																
Working with Partners/Locations																
Concept Development																
Identifying Opportunities																
Low Fidelity Prototype																
User Evaluation																
Medium Fidelity Prototype																
User Evaluation																
Implementation																
Developing the Prototype																
Order/Purchase/Rental of Material																
Structural Planning																
Pulling Resources Together																
Installation																
User Evaluation																
Final Presentation																

Table A.1 Class schedule and syllabus for the Fall 2010 Communication Design Workshop

Themes¹⁵ used as basis of the semi-structured interview with graduate students of

Design

This research is for my PhD, its purpose is to:

- 1) Look at the design of public creativity (explain public creativity)
- 2) How designers think when designing public installations

The purpose of this 1.5 hour interview is to look at:

- 1) How you designed your State Street installation
- 2) What went through your [designer] mind when designing the installation
- 3) How you adopted existing [show framework] and developed new frameworks for design

Interview:

- 1) For the record, tell me something about yourself
- 2) Tell me about your State Street project
- 3) What was most interesting about the project?
 - a. Why did you choose this particular design?

¹⁵ These themes were used as guidelines for the interview. Not all questions were asked of every student, nor were all questions important to ask for every interview. The themes provided points of discussion based on how the conversation proceeded.

- b. Did you go through several designs before settling on this one?
 - c. What was the process of selection/elimination?
 - d. What criteria did you use for selection/elimination?
- 4) How did working in a team affect your design process?
- 5) How did working in a public realm affect your design process?
- 6) How much embedded/displaced observation/user testing did you do?
- 7) Do you remember this Framework?
- a. What role did it play in your design process?
 - b. Did you create your own framework?

Card Sort Study:

- 8) I have broken the framework into component parts
- a. Are you familiar with these parts?
- 9) I want you to arrange the parts:
- a. Think of the most logical format in terms of a design process (what parts will help you to design a public interface in the future)
 - b. Think of the most logical grouping of the components